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REM IV

Remedial Planning Activities
at Selected Uncontrolled
Hazardous Waste Sites - Zone II.

88004716

SFUND RECORDS CTR

0217-00048



Environmental Protection Agency
Hazardous Site Control Division

Contract No. 68-OI-7251

RECORD OF DECISION SUMMARY
FOR
SECTION 16 OPERABLE UNIT
PHOENIX-GOODYEAR AIRPORT
SUPERFUND SITE
GOODYEAR, ARIZONA

W.A. NO. 030-9L19.0
September 25, 1987

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Black & Veatch
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PRC
Ecology and Environment

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DECLARATION FOR THE RECORD OF DECISION

SITE

Phoenix-Goodyear Airport (PGA) site, Section 16 Operable Unit, Goodyear, Arizona.

PURPOSE

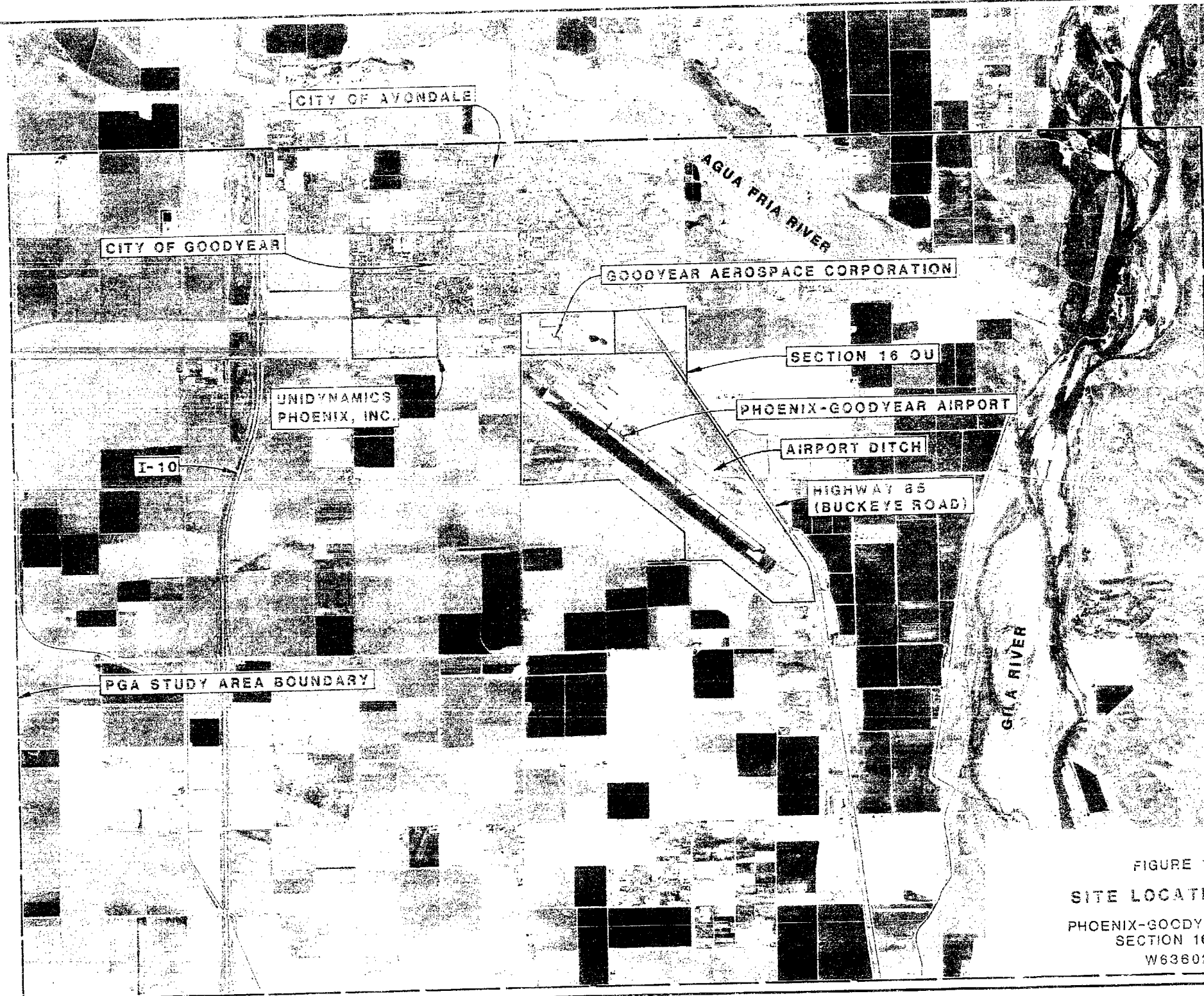
This decision document represents the selected remedial action for the Section 16 Operable Unit at the PGA Superfund site (see Figure 1). This operable unit addresses groundwater contamination in the upper alluvial unit only in Section 16. Groundwater contamination beyond Section 16, as well as soil contamination, will be addressed in the final remedial action. This remedial action was developed in accordance with CERCLA, as amended by SARA, and the National Contingency Plan. The Arizona Department of Environmental Quality and Arizona Department of Water Resources have agreed to the selected remedy.

BASIS

This decision is based on the administrative record for the PGA site, which includes the Phase I Remedial Investigation and the Section 16 Operable Unit Feasibility Study. The attached index (Appendix A) identifies the items contained in the administrative record upon which the selection of the remedial action is based.

DESCRIPTION

The PGA site is located approximately 17 miles to the west of Phoenix, Arizona. The site is divided into a northern and a southern area by a groundwater divide running under the Yuma Road area. Section 16 lies in the southern area and includes the Loral Corporation facility (formerly owned by Goodyear Aerospace Corporation) and the Phoenix-Goodyear Airport (formerly owned by U.S. Navy), both being potential sources of volatile organic compound (VOC) contamination. Groundwater contaminant concentrations in Section 16 are at least 100 times greater than those of downgradient levels. Development by the City of Goodyear is planned for the area west, or downgradient, of Section 16. This development will include using the groundwater resources currently threatened by contamination in Section 16. As a result, the Section 16 Operable Unit was designed to address these high levels of groundwater contamination. An operable unit is a remedial action that is separated from the overall site cleanup



SCALE:
1 INCH = 3000 FT±

FIGURE 1
SITE LOCATION MAP
PHOENIX-GOODYEAR AIRPORT
SECTION 16 ROD
W63602.RA

actions when it can be done expeditiously, is cost-effective, prevents contaminant migration, and is consistent with the final site remedy.

To meet these objectives, the following remedial action has been chosen. The chosen alternative segregates the water in the upper alluvial unit into Subunit A, which is presently unsuitable for drinking water due to its high dissolved solids content, from the aquifers in Subunit B/C, which is a potential drinking water source. (Subunits B and C have been combined as Subunit B/C because, in this area, they are hydraulically connected.) The rationale for this operable unit is that it will stop contamination within Subunit A from spreading laterally, and it will prevent contamination from Subunit A to enter Subunit B/C via the casing of existing wells in the area. Subunit B/C is planned for future use of the City of Goodyear in areas directly downgradient of the site. For Subunit A, until levels of contaminants are reduced to meet Applicable or Relevant and Appropriate Requirements (ARARs), water will be pumped from the entire Section 16 area, and air stripping will be used to reduce VOC contamination to meet federal and state standards for drinking water (see Table 1). The air stripping towers will be equipped with air emission controls in order to meet county requirements that all new air emission sources employ reasonably achievable control technology to reduce emissions, and as promulgated by the Superfund Amendment and Reauthorization Act (SARA), remedies should significantly and permanently reduce the volume, toxicity, and mobility of the contaminants.

At this time, aquifers in Subunit B/C are being pumped by Loral Corporation for industrial and drinking water purposes and by the Phoenix-Goodyear Airport for domestic supply. All water used for drinking is sent to a carbon adsorption system for treatment. This pumping system is helping to contain contaminant migration in a manner that is acceptable for this interim period until the final remedy is chosen. In addition, clusters of newly installed deep monitoring wells to the west of the airport will monitor Subunit B/C and detect any contaminant migration away from the source area. Therefore, no expedited remedial action is planned for Subunit B/C at this time. Pumping schedules for Loral Corporation and the airport will be designed to optimize production needs with control of the contaminant plume.

The level of treatment will be in accordance with federal and state standards. Treated water from the Subunit A aquifer will be reinjected into that same aquifer to minimize the environmental impact of additional groundwater withdrawal.

Table 1
STATE AND FEDERAL
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS^a AND OTHER CRITERIA
(concentrations in ppb)

Compound	SDWA MCL	SDWA MCLG	Proposed MCL	Proposed MCLG	AWQC Drinking Water Only	ADHS Action Level	Treatment Plant Discharge Level
Trichloroethylene	5	0				5	5
1,1,1-Trichloroethane	200	200				200	200
1,1-Dichloroethylene	7	7				1	7
Perchloroethylene				0		3	3
Trans-1,2-dichloroethylene			70				70
Carbon tetrachloride ^b	5	0				1	5
Chloroform					0.5		0.5
Chromium	50			120			50
Arsenic	50			50			

^aClean Water Act requirements will be determined during NPDES review.

^bSource is not a byproduct of municipal water supply chlorination.

NOTES: ADHS--Arizona Department of Health Services
AWQC--Ambient Water Quality Criteria
MCL---Maximum Contaminant Level
MCLG--Maximum Contaminant Level Goal
SDWA--Safe Drinking Water Act
DW--Drinking Water

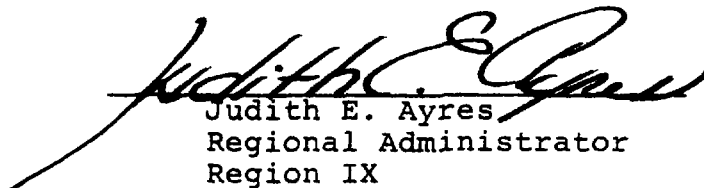
Sources: U.S. EPA 1986. Public Health Assessment Manual
ADHS 1987. S. Eberhart

DECLARATION

The selected remedy for this operable unit is protective of human health and the environment, meets federal and state requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. All permit requirements will be met during the implementation of this remedial action. It is determined that the remedy for this operable unit uses permanent solutions and alternative treatment technologies to the maximum extent practicable. The Arizona DEQ has concurred with the remedy presented on this document.

29 SEP 1987

Date


Judith E. Ayres
Regional Administrator
Region IX

RECORD OF DECISION
CONCURRENCE PAGE

Site: Phoenix-Goodyear Airport, Goodyear, Arizona

The attached Record of Decision package for the Phoenix-Goodyear Airport, Goodyear, Arizona, has been reviewed and I concur with the contents.

Date

9/25/87

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Mary Ann Muirhead
Acting Deputy Regional Counsel
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Agency, Region IX

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RD/R20/026

I. SITE DESCRIPTION

The Phoenix-Goodyear Airport (PGA) site covers a total area of about 35 square miles and is located about 17 miles due west of Phoenix, Arizona, in the western part of the Salt River Valley. The Section 16 Operable Unit covers about 750 acres and is located west of the City of Goodyear. The towns of Goodyear and Avondale border the site on the eastern edge, occupying about 2 square miles. The remaining land is presently used primarily for agriculture. The general area had a combined population of about 30,000 people in 1985.

The two major surface-water drainages within the area are the Gila River to the south and the Agua Fria River to the east. The Gila River flows perennially due to releases from treatment plants. The Agua Fria River is dry most of the year with occasional flows resulting from releases from dams, irrigation tailwaters, or treatment plants. The Agua Fria River drains south into the Gila River, which then flows to the west.

Drinking water supplies, industrial water supplies, and irrigation water come solely from groundwater that is pumped from the alluvial deposits of the western Salt River Valley underlying the entire area.

Section 16 contains the Loral Corporation facility (formerly owned by Goodyear Aerospace Corporation) and the Phoenix-Goodyear Airport (formerly operated by the U.S. Navy), both of which have been identified as sources of contamination in the southern area of the PGA site.

II. SITE HISTORY AND BACKGROUND

SITE HISTORY

In 1981, the Arizona Department of Health Services discovered that groundwater in the PGA area was contaminated with solvents and chromium. Additional sampling of wells in 1982 and 1983 found 18 wells contaminated with trichloroethene (TCE). As a result, the EPA added the PGA site to the National Priorities List in September 1983. In 1984, EPA began a remedial investigation of the Litchfield Airport Area (presently known as the Phoenix-Goodyear Airport) to characterize the site, discover the extent of the contamination, and identify possible sources.

Historical data indicate two primary contributors to the groundwater contamination in the Section 16 area: Goodyear Aerospace Corporation (GAC), currently owned by Loral Corporation, and activities carried out by the Navy at the Litchfield Park Naval Air Facility. Historical data on waste handling at GAC and PGA can be found in the Section 16 Operable Unit Feasibility Study.

Sampling data for groundwater identified two major areas of contamination, a northern area and a southern area. Most of the contamination in the southern area of the site was isolated within Section 16. The Section 16 Operable Unit Feasibility Study was initiated in 1987 to identify remedial actions to contain further migration of contaminants and deterioration of the aquifer.

Soil and soil gas sampling is currently being done to characterize soil contamination in Section 16. Soil and groundwater contamination will be addressed in the feasibility study for the entire site.

SITE CHARACTERIZATION

The site is located in a region having a climate characterized by long, hot summers and short, mild winters. Relative humidity is low, particularly during early summer, and the rainfall averages about 7.1 inches per year. The average daily maximum temperature in July is 107°F, the average daily minimum temperature in January is 34°F, and the average yearly temperature is 70°F.

Groundwater is pumped from the alluvial deposits of the western Salt River Valley. These deposits consist of the Upper Alluvial Unit, the Middle Fine-Grained Unit, and the Lower Conglomerate Unit, as shown in Figure II-1. The Upper Alluvial Unit has been further subdivided into Subunit A, from the surface to about 120 feet deep; Subunit B, from about 120 to 240 feet deep; and Subunit C, from about 240 to 360 feet deep. Subunits B and C are hydraulically connected.

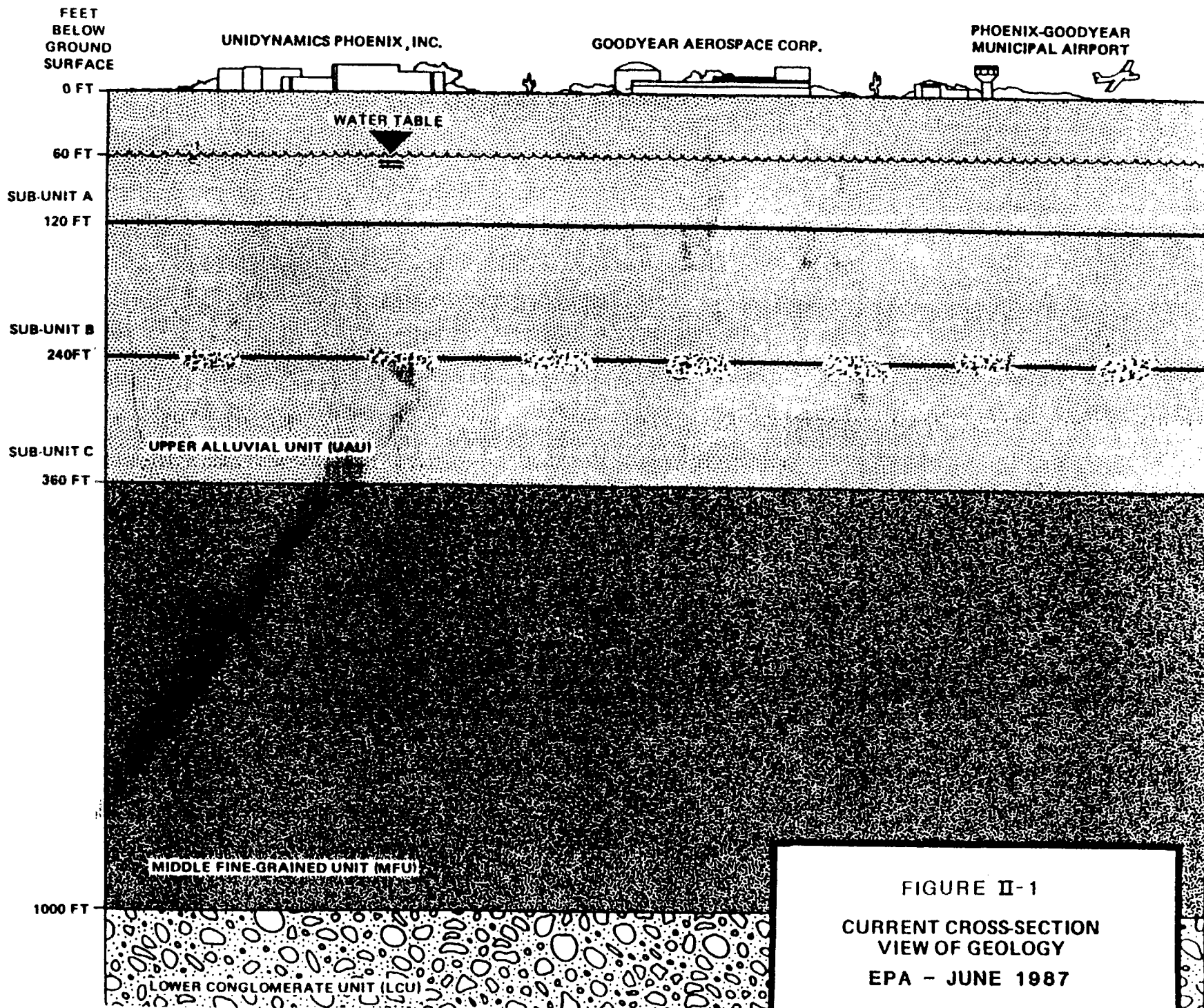


FIGURE II-1
CURRENT CROSS-SECTION
VIEW OF GEOLOGY
EPA - JUNE 1987
W83602.RA

Most wells in the area pump water from a zone between 100 and 600 feet deep. Depth to the water table has varied in the past, but recently has been measured between 40 and 100 feet below the ground surface. Groundwater flows in the PGA area are divided at approximately Yuma Road. The northern area has groundwater flows to the northwest, and the southern area, including Section 16, has groundwater flows to the southwest.

In addition to the TCE and chromium identified earlier, several other compounds were found to contaminate the groundwater. Among these are perchloroethene (PCE), 1,1-dichloroethene (1-1 DCE), chloroform, carbon tetrachloride, and arsenic. Table II-1 identifies the wells tested, concentrations detected, and the applicable federal or state standards or other criteria. Not all wells tested in the PGA area are listed in this table. The wells noted in this table were selected as representative samples of groundwater quality. Figures II-2 and II-3 show well locations and average concentrations of contaminants found in the Section 16 Upper Alluvial Unit (Subunit A and Subunit B/C). The highest contamination levels are found in the Subunit A, which is linked to the Subunit B/C by conduit wells.

RECEPTORS

ENVIRONMENT

The environment of the PGA area is typical of the Phoenix/Southwest region. Within the PGA site, there are no unique habitats nor any threatened or endangered species. Native vegetation at the site is sparse. However, located immediately south of the site, the lower Gila River represents the important riparian habitat in southwestern Arizona. Species that inhabit or migrate through the area include four federally listed endangered species: brown pelican (*Pelecanus occidentalis*), Yuma clapper rail (*Rallus longirostris yumanensis*), peregrine falcon (*Falco peregrinus*), and the bald eagle (*Haliaeetus leucocephalus*).

The PGA area, particularly near the Gila River, supports viable hunting populations of mourning dove, white-winged dove, Gambel's quail, and various waterfowl. The area is especially popular for dove hunting and is known to support one of the largest breeding dove colonies in the Southwest.

POPULATION

In 1985, the combined population of the Goodyear and Avondale area was 30,000. The City of Goodyear has stated in its general plan that the city expects to grow at a rapid pace, exceeding 140,000 people within 20 years.

Table II-1
COMPARISON OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND OTHER CRITERIA TO GROUNDWATER DATA: SUMMARY AS OF AUGUST, 1986

Well/Station ID	Compound	Concentration (µg/l)	ARAR Exceeded	Other Criteria Exceeded
16EMW-1	Trichloroethene	Maximum 1	--	--
		Average 1	--	--
16EMW-2	1,1-Dichloroethene	Maximum 9	MCL, AWQC (10^{-6}) ^a	ADHS action level
		Average <4	MCL, AWQC (10^{-6})	--
	Trichloroethene	Maximum 75	MCL, AWQC (10^{-6})	ADHS action level
		Average 33	MCL, AWQC (10^{-6})	ADHS action level
16EMW-3	1,1-Dichloroethene	Maximum 140	MCL, AWQC (10^{-6})	ADHS action level
		Average 126	MCL, AWQC (10^{-6})	ADHS action level
	Trichloroethene	Maximum 490	MCL, AWQC (10^{-6})	ADHS action level
		Average 342	MCL, AWQC (10^{-6})	ADHS action level
	Chromium (total)	Maximum 513	MCL, AWQC (toxicity) ^c	HA ^d --longer term/ 70 kg, lifetime
		Average 472	MCL, AWQC (toxicity)	HA--longer term/ 70 kg, lifetime
16GMW-1	Trichloroethene	Maximum 41.7	MCL, AWQC (10^{-6})	ADHS action level
		Average 34	MCL, AWQC (10^{-6})	ADHS action level
	Chromium (total)	Maximum 190	MCL, AWQC (toxicity)	HA--lifetime
		Average 150	MCL, AWQC (toxicity)	--
16GMW-2	Chloroform	Maximum 12.8	AWQC (10^{-6})	--
		Average <4.6	AWQC (10^{-6})	--
	Carbon tetrachloride	Maximum 5.1	MCL, AWQC (10^{-6})	ADHS action level
		Average <2	MCL, AWQC (10^{-6})	ADHS action level
	Methylene chloride	Maximum 13.2	--	ADHS action level
		Average <6.8	--	ADHS action level
	Trichloroethene	Maximum 24.9	MCL, AWQC (10^{-6})	ADHS action level
		Average 21	MCL, AWQC (10^{-6})	ADHS action level
16GMW-3	1,1-Dichloroethene	Maximum 12.8	MCL, AWQC (10^{-6})	ADHS action level
		Average 10.8	MCL, AWQC (10^{-6})	ADHS action level
	Chloroform	Maximum 9.3	AWQC (10^{-6})	--
		Average 7.4	AWQC (10^{-6})	--
	Carbon tetrachloride	Maximum 5.1	MCL, AWQC (10^{-6})	ADHS action level
		Average 3.5	MCL, AWQC (10^{-6})	ADHS action level
	Trichloroethene	Maximum 155	MCL, AWQC (10^{-6})	ADHS action level
		Average 102.7	MCL, AWQC (10^{-6})	ADHS action level

Table II-1
(continued)

Well/Station ID	Compound	Concentration (µg/l)	ARAR Exceeded	Other Criteria Exceeded
16GMW-3 (continued)	Chromium (total)	Maximum 1,340	MCL, AWQC (toxicity)	HA--longer term/ 10 kg & 70 kg, lifetime
		Average 977	MCL, AWQC (toxicity)	HA--longer term/ 10 kg & 70 kg, lifetime
GAC #2	Trichloroethene	Maximum 16	MCL, AWQC (10^{-6})	ADHS action level
		Average 9.8	MCL, AWQC (10^{-6})	ADHS action level
GAC #3	Trichloroethene	Maximum 110	MCL, AWQC (10^{-6})	ADHS action level
		Average 44	MCL, AWQC (10^{-6})	ADHS action level
	Chromium (total)	Maximum 170 Average 170	MCL, AWQC (toxicity)	--
GAC #4	Trichloroethene	Maximum 45	MCL, AWQC (10^{-6})	ADHS action level
		Average 12	MCL, AWQC (10^{-6})	ADHS action level
PLA #2	Trichloroethene	Maximum 36	MCL, AWQC (10^{-6})	ADHS action level
		Average 12.4	MCL, AWQC (10^{-6})	ADHS action level
PLA #3	1,1-Dichloroethene	Maximum 6 Average 6	AWQC (10^{-6})	--
	Trichloroethene	Maximum 310 Average 256	MCL, AWQC (10^{-6}) MCL, AWQC (10^{-6})	ADHS action level ADHS action level
PLA #4	Arsenic	Maximum 96 Average 96	MCL, AWQC (10^{-6}) MCL, AWQC (10^{-6})	HA--all categories
LPSC #4	Chloroform	Maximum 1.4 Average 1.4	AWQC (10^{-6})	--
LPSC #5	Chloroform	Maximum 5.1 Average 5.1	AWQC (10^{-6})	--
GF #27C	Chloroform	Maximum 3.2 Average 3.2	AWQC (10^{-6})	--
GF #3B	Chloroform	Maximum 0.8 Average 0.8	AWQC (10^{-6})	--

Table II-1
(continued)

Well/Station ID	Compound	Concentration (µg/l)	ARAR Exceeded	Other Criteria Exceeded
GF #4A	Trichloroethene	Maximum 22	MCL, AWQC (10^{-6})	ADHS action level
		Average 10.5	MCL, AWQC (10^{-6})	ADHS action level
COTRIR	Chloroform	Maximum 1	AWQC (10^{-6})	--
		Average 0.77	AWQC (10^{-6})	--
	Trichloroethene	Maximum 4.5	MCL, AWQC (10^{-6})	--
		Average 3.3	MCL, AWQC (10^{-6})	--
DOMEST #3	Trichloroethene	Maximum 2.3	MCL	--
		Average 2.3		
PHILLIPS	Trichloroethene	Maximum 12	MCL, AWQC (10^{-6})	ADHS action level
		Average 10.3	MCL, AWQC (10^{-6})	ADHS action level
PLUMB	Trichloroethene	Maximum 3	MCL, AWQC (10^{-6})	--
		Average 3		
R.WOOD1	Trichloroethene	Maximum 3	MCL	--
		Average 2.5	MCL	--
R.WOOD2	Trichloroethene	Maximum 2	MCL	--
		Average <1.3	MCL	--
R5.6W3.5	Trichloroethene	Maximum 1.7	MCL	--
		Average <1.1	MCL	--
RAYNER2	Trichloroethene	Maximum 3	MCL, AWQC (10^{-6})	--
		Average 3		
RECMET2	Trichloroethene	Maximum 6	MCL, AWQC (10^{-6})	ADHS action level
		Average 4.4	MCL, AWQC (10^{-6})	--
S.SMITH2	Trichloroethene	Maximum 3	MCL, AWQC (10^{-6})	--
		Average 2	MCL	--
SHAWVER	Trichloroethene	Maximum 3	MCL, AWQC (10^{-6})	--
		Average 3		

^a AWQC(10^{-6})=the ambient water quality criteria that results in a 10^{-6} excess lifetime cancer risk.

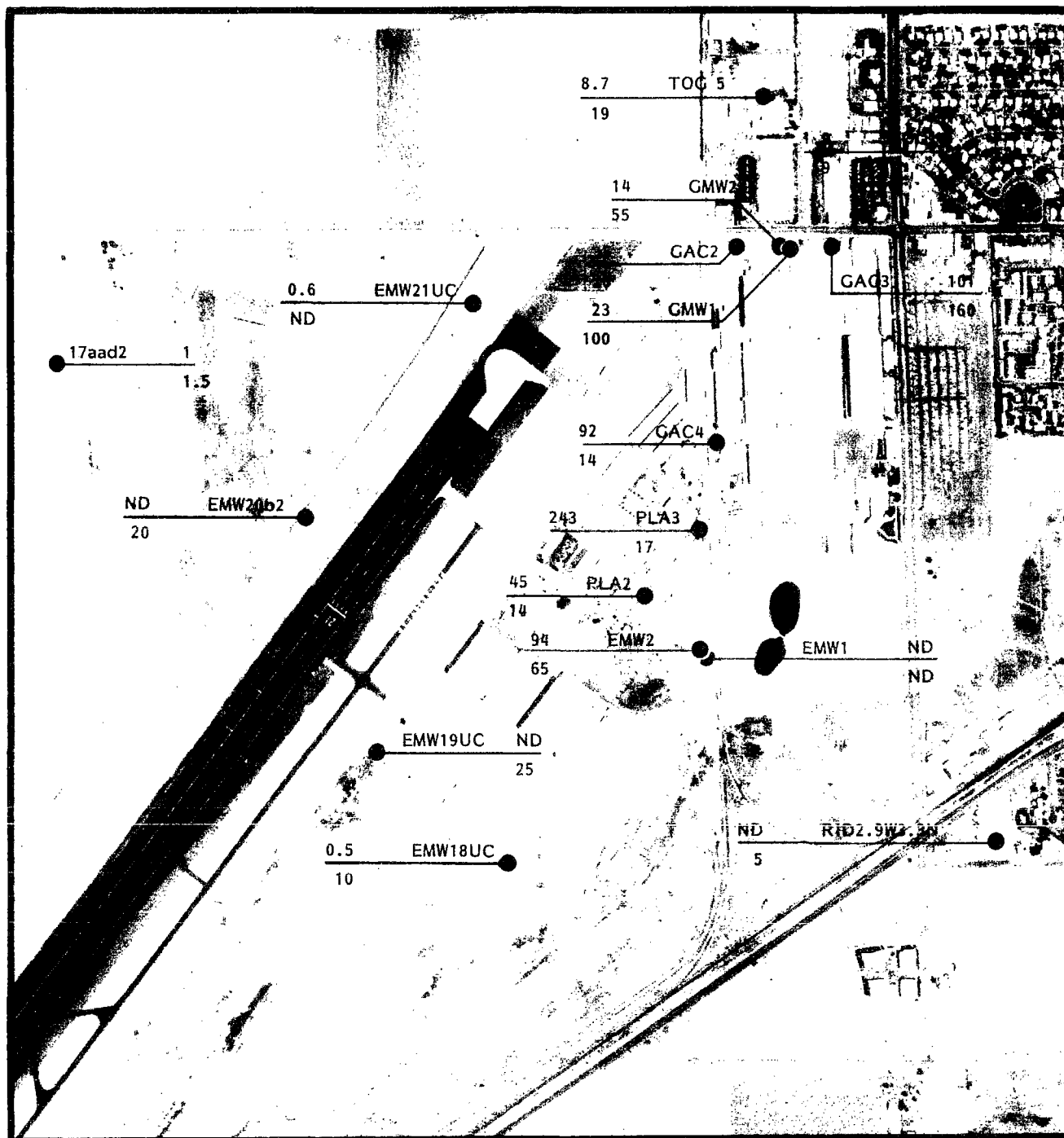
^b ADHS action level=Arizona Department of Health Services action level.

^c AWQC (toxicity)=the ambient water quality criteria for human toxicity.

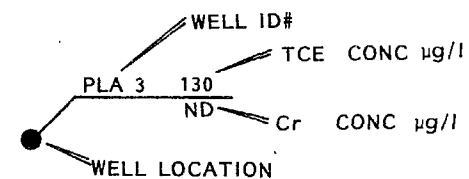
^d HA=Health advisory.

MCL=Maximum contaminant level.

MCL=Maximum contaminant level goal.



LEGEND



ND = NOT DETECTED

NOTE: CONCENTRATIONS OF CONTAMINANTS ARE BASED ON DATA COLLECTED DURING MARCH AND JUNE 1987. CONCENTRATIONS ARE SINGLE EVENT.

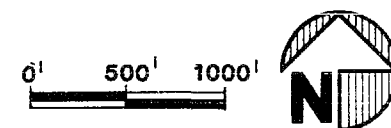
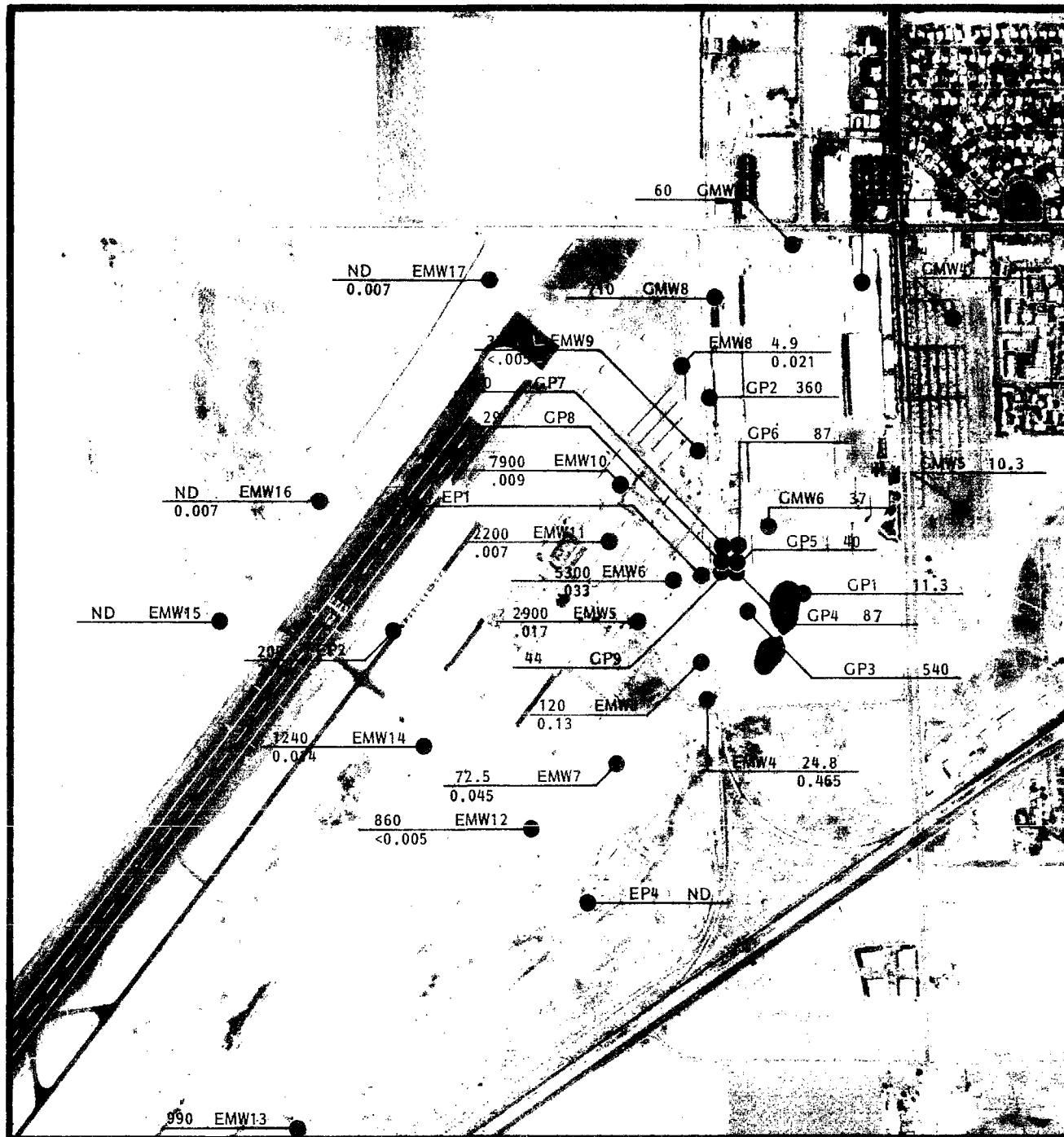


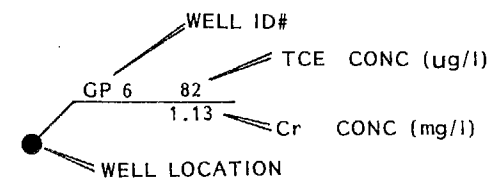
FIGURE II-2

GROUNDWATER CONTAMINATION MAP
SUBUNITS B/C

PHOENIX-GOODYEAR AIRPORT
W63602.R4



LEGEND



ND = NOT DETECTED

NOTE: CONCENTRATIONS OF CONTAMINANTS ARE BASED ON DATA COLLECTED DURING 1986 AND 1987. CONCENTRATIONS ARE MEAN OR SINGLE EVENT.

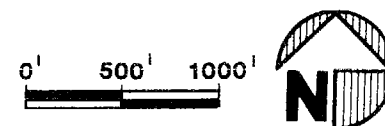


FIGURE II-3
GROUNDWATER CONTAMINATION MAP
SUBUNIT A
PHOENIX-GOODYEAR AIRPORT
W63602.RA

All drinking water wells currently in use for municipal supply meet applicable federal and state health standards. However, future population growth will result in greater usage of groundwater resources, particularly in the contaminated areas. Use of the groundwater will result in a potential exposure to contaminants through the means described in Figure II-4, if no action is taken at this site and contamination migrates to areas that contribute to municipal groundwater supply.

TOXICITY

ORGANIC COMPOUNDS

This group of compounds includes most of the contaminants identified at the PGA site. Several of these compounds, carbon tetrachloride, chloroform, 1,1,1-trichloroethane, perchloroethene, and trichloroethene, may produce liver injury. Carbon tetrachloride and chloroform have more serious effects on the liver than trichloroethene and perchloroethene (Doull et al., 1980). Carbon tetrachloride, chloroform, perchloroethene, and trichloroethene have been classified by the EPA Carcinogen Assessment Group (CAG) as probable human carcinogens via ingestion (U.S. EPA, 1986a).

Exposures to the above compounds through inhalation may result in central nervous system depression, including anesthesia. TCE has been used as an anesthetic (National Research Council, [NRC] 1977). Other effects may include irritation of the mucous membranes of the nose and throat and irritation to the eyes (NRC, 1980). Trichloroethene and perchloroethene are also classified as probable human carcinogens by CAG via the inhalation route (U.S. EPA, 1986a).

1,1-Dichloroethene and trans-1,2-dichloroethene exhibit similar toxic effects to humans through inhalation and ingestion exposures. These compounds have anesthetic properties, and exposures to high concentrations may cause nausea and vomiting (U.S. EPA, 1985a). The CAG has classified 1,1-dichloroethene as a possible human carcinogen for both inhalation and ingestion exposure routes (U.S. EPA, 1986a).

INORGANIC COMPOUNDS

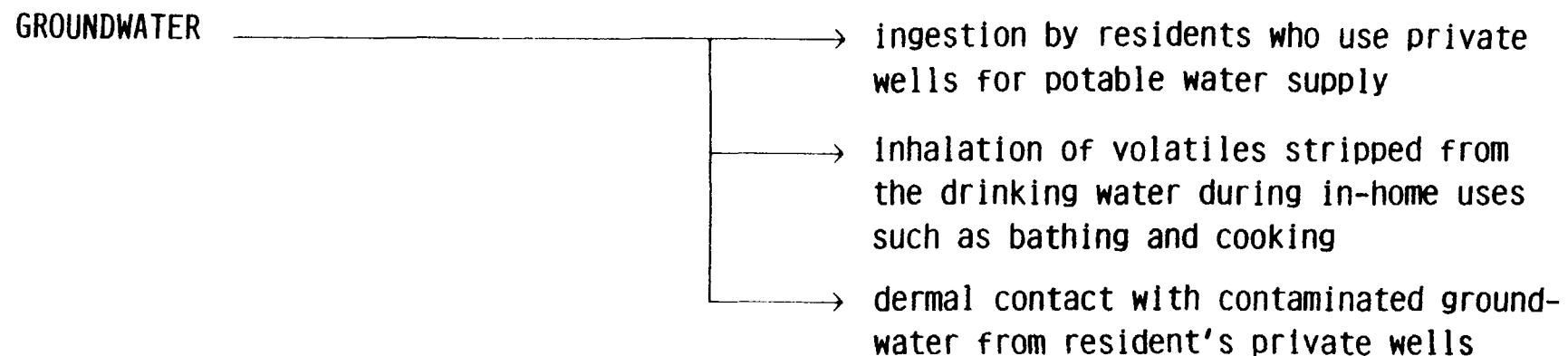
This group of compounds includes metals. Some of the inorganic compounds detected at the PGA site, such as chromium, are much more toxic than others.

CHROMIUM

Chromium has been identified in some water samples taken from the site in both the trivalent and hexavalent states.

MEDIA

DIRECT EXPOSURE PATHWAY → RECEPTOR



**FIGURE II-4
EXPOSURE PATHWAY AND
RECEPTOR SUMMARY**

PHOENIX GOODYEAR AIRPORT
SECTION 16 OUF5

Chromium compounds in the trivalent (+3) state are of a low order of toxicity. In the hexavalent (+6) state, chromium compounds are irritants and corrosive and can enter the body by ingestion, inhalation, and through the skin (Sittig, 1981). Hexavalent chromium may cause liver and kidney damage, internal bleeding, and respiratory disorders (U.S. EPA, 1985b). Hexavalent chromium has been designated by the CAG as a human carcinogen via the inhalation route (U.S. EPA, 1986a).

RISK

Risk is a function of both toxicity and exposure. At present, the exposure to contaminated groundwater is limited, and the population and environment are not in any immediate danger. However, future migration of the contaminants could affect plant and animal life, and future use of contaminated groundwater will result in heightened risks as shown in Table II-2.

The risk associated with exposures to contaminated groundwater, particularly for future use scenarios, is an excess lifetime cancer risk. This risk can go as high as 2×10^{-3} (two excess lifetime cancer occurrences per 1,000 people exposed over the course of a 70-year lifetime). There does not appear to be an ingestion risk from exposure to noncarcinogens. More information on health effects associated with contaminants found at the PGA site can be found in the Preliminary Public Health Endangerment Assessment in the administrative record.

Table II-2
SUMMARY OF EXPOSURE ROUTES AND RISKS

Media	Exposure Setting	Exposure Risk	Results
Groundwater	Residential--Current and Potential	Ingestion ^a	<ul style="list-style-type: none"> o For the Goodyear municipal wells (COG #1,2,3,6), there is an excess lifetime cancer risk of 2×10^{-6} based on the maximum trichloroethylene concentration for these wells. There does not appear to be a risk from the intake of noncarcinogens. COG #1,2,3,6 are blended to provide water as demanded. o For the private domestic wells PLUMB, SHAWVER, and DOMEST3, the risk due to trichloroethylene contamination of these wells can only be qualified because fewer than three samples were collected from each well. A carcinogenic health risk may be present; however, the exact nature of the risk cannot be identified. There does not appear to be a risk from the intake of noncarcinogens.
		Inhalation	<ul style="list-style-type: none"> o The risk from inhalation of volatiles released from the groundwater in the course of in-home uses such as cooking, bathing, etc., cannot be quantified. However, it should be recognized that this exposure could contribute to the overall risk from the use of contaminated groundwater.
	Residential--Potential Only	Ingestion ^a	<ul style="list-style-type: none"> o The GAC monitor wells follow with excess lifetime cancer risks of 2×10^{-4} based on the maximum concentration of 1,1-dichloroethene, 2×10^{-5} for carbon tetrachloride, 3×10^{-5} for chloroform, and 5×10^{-5} for trichloroethylene, all based on the maximum concentration of each constituent from the three wells. There does not appear to be a risk from the intake of noncarcinogens.
			<ul style="list-style-type: none"> o For the EPA monitor wells, there is an excess lifetime cancer risk of 2×10^{-3} for 1,1-dichloroethene and 1×10^{-4} for trichloroethene, based on their maximum concentrations, due to exposure through ingestion of groundwater. There does not appear to be a risk from the intake of noncarcinogens.

Table II-2
(continued)

Media	Exposure Setting	Exposure Risk	Results
Groundwater	Residential--Potential Only	Ingestion	<p>o Other wells in the area that presented an excess lifetime cancer risk due to trichloroethylene include the following:</p> <ul style="list-style-type: none"> - GAC #3: 3×10^{-5} based on the maximum concentration - GAC #4: 1×10^{-5} based on the maximum concentration - PLA #2: 1×10^{-5} based on the maximum concentration - PLA #3: 1×10^{-4} based on the maximum concentration <p>There was also an excess lifetime cancer risk of 6×10^{-3} for COG #5 (fire control well) due to the maximum concentration of arsenic. There does not appear to be a risk from the intake of noncarcinogens.</p> <p>o The risk from inhalation of volatiles released from the groundwater in the course of in-home uses such as cooking, bathing, etc., cannot be quantified. However, this exposure could contribute to the overall risk from the use of contaminated groundwater.</p>

^a Assumptions: Daily water intake for 0-6 years, 1.0 liter/day; 6-18 years, 1.4 liters/day; 18-70 years, 2.0 liters/day. Lifetime average daily intake for drinking water - 0.029 liter/kg of body weight/day based on a 70 kg individual consuming 2 liters/day of water over the course of a 70-year lifetime.

III. ENFORCEMENT HISTORY

In Section 16, two responsible parties have been identified as the major sources of groundwater contamination, Goodyear Aerospace Corporation (GAC) and the Department of Defense (for past naval operations).

GAC has been participating in the RI/FS since 1984. Its efforts have been concentrated on determining the extent of soil contamination at the facility and the extent of groundwater contamination underneath the GAC facility and the PGA. A history of EPA enforcement actions toward GAC includes:

- o July 23, 1982--RCRA Section 3007/CERCLA Section 104 request for information issued to GAC
- o March 27, 1984--General notice letter sent to GAC from EPA
- o March 27, 1984--RCRA Section 3013/CERCLA Section 106 Administrative Order on consent issued to GAC
- o December 20, 1984--Violation of the Clean Water Act issued to GAC from EPA
- o January 14, 1986--Violation of the Clean Water Act issued to GAC from EPA
- o March 19, 1986--CERCLA Section 106 Administrative Order on consent signed by GAC and EPA

The U.S. Corps of Engineers had begun researching Navy activities at the airport and believed that the Navy is a potentially responsible party for the groundwater contamination emanating from the PGA area. The Navy had sold the facility to the City of Phoenix in 1968. The U.S. Corps of Engineers was assigned in May 1985 to represent the Department of Defense on the Phoenix-Goodyear Airport Interagency Committee, which was established by EPA to involve state and local agencies as well as responsible parties in CERCLA actions at the site.

GAC is currently conducting RI activities at the site in accordance with the March 19, 1986, order. These activities will be completed by the end of the calendar year.

IV. COMMUNITY RELATIONS HISTORY

The following is a list of community relations activities conducted by the U.S. EPA at the PGA Superfund site (formerly the Litchfield Airport Area [PLA] site):

- o EPA conducted interviews with Goodyear and Avondale residents and state and local officials in 1984 to improve EPA's understanding of community concerns. These interviews provided the basis for the Phoenix-Litchfield Airport Area Community Relations Plan released in October 1984.
- o EPA established information repositories at the Avondale Public Library, Phoenix Public Library, and the Arizona Department of Health Services. EPA updated repositories periodically with fact-sheets and other relevant documents.
- o EPA established a computerized mailing list with over 200 addresses of interested individuals.
- o EPA contributed PGA-related information to Groundwater Quality Update, a newsletter that provides information about groundwater quality to interested parties, prepared and distributed by the Arizona Department of Health Services.
- o EPA distributed a factsheet in July 1984 which provided an overview of the Superfund process, a brief description of the PGA site contamination, and described proposed remedial investigation/feasibility study (RI/FS) activities.
- o EPA held a community meeting on August 1, 1984, to provide an overview of the Superfund process, information on past site activities, and outlined future RI/FS activities.
- o EPA distributed an "Update on Site Activities" factsheet in February 1985 which described ongoing RI/FS activities including water level measurement and water quality sampling, soil boring and sampling, well installation, and computer modeling.
- o EPA released the "Water and Soil Sample Results" factsheet in June 1985 which reported the results of the soil and water sampling, and discussed how this information would be used in the second phase of the RI/FS.
- o EPA held a community meeting on February 19, 1986, to report the remedial investigation Phase I

results, and to discuss the additional information needed to complete the RI and the plan for obtaining this information during the upcoming RI Phase II activities.

- o EPA sent out a factsheet in January 1987 which provided groundwater sampling results and discussed the Operable Unit Feasibility Study (OUFS).
- o EPA distributed a factsheet in May 1987 announcing the release of the OUFS and the beginning of a public comment period for the study, as well as announcing a community meeting on June 4, 1987.
- o EPA held a public comment period from June 2, 1987, to July 2, 1987, on the draft OUFS and prepared a responsiveness summary to address the comments received.
- o EPA announced the public comment period on the draft OUFS and the public meeting with a public notice placed in Goodyear's weekly newspaper Westsider which ran on Thursday, May 28, 1987, and Thursday, June 4, 1987.

In addition, EPA will continue to conduct ongoing community relations activities at the PGA site throughout the duration of the comprehensive RI/FS.

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V. ALTERNATIVES EVALUATION

LISTING OF ALTERNATIVES

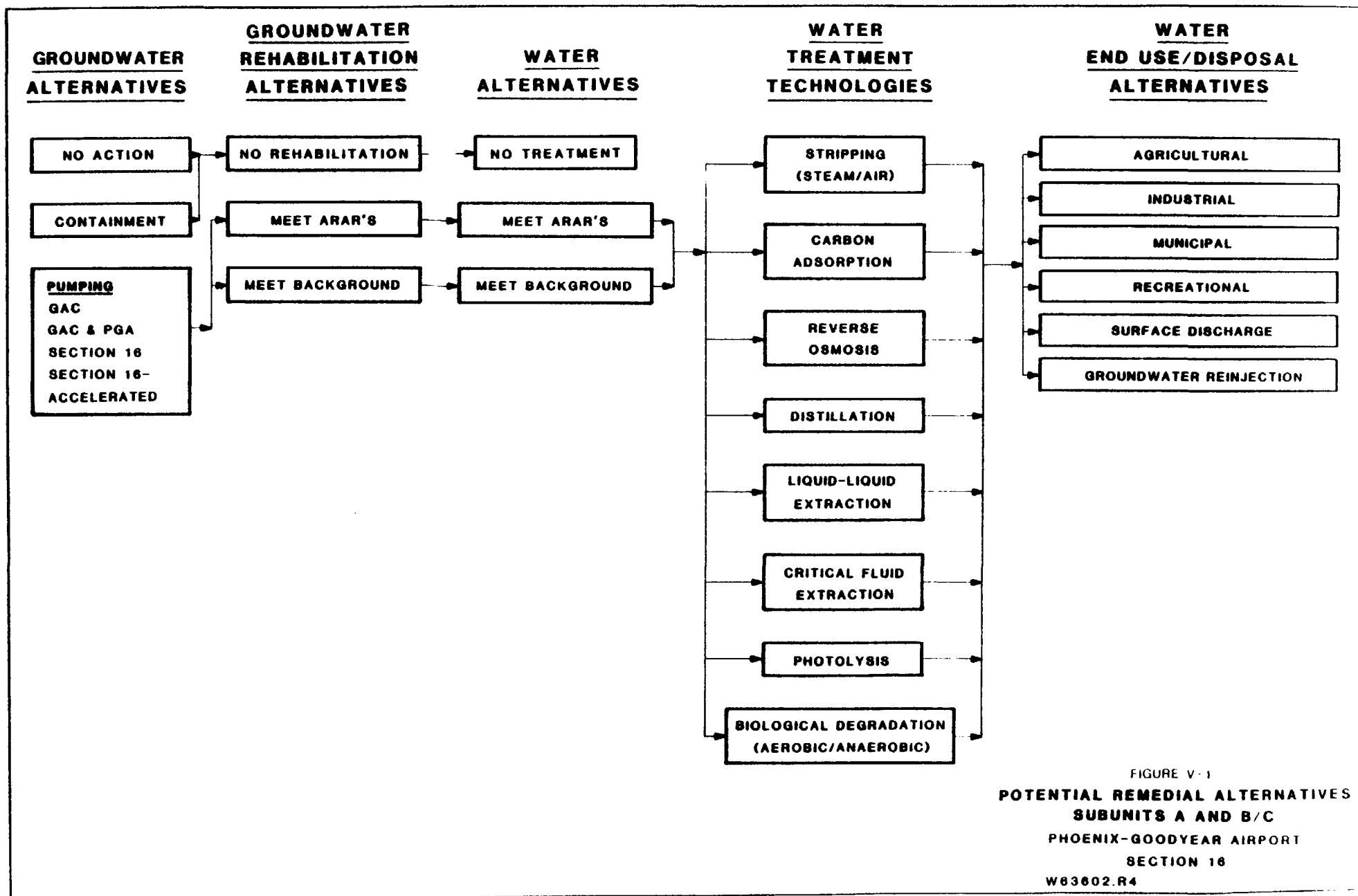
A wide range of alternatives was identified for the Section 16 Operable Unit. These alternatives were separated into three groups: groundwater, water treatment, and water end use (see Figure V-1). Groundwater alternatives were selected to compare the relative values of containing or pumping different areas of groundwater contamination at different rates. Treatment alternatives were selected based on institutional requirements and the best available technology. Water end use alternatives were selected based on the feasibility of delivering the water and the distance to sites capable of accepting the estimated flows. As shown in Figure V-1, if groundwater pumping and rehabilitation alternatives are selected, an appropriate water treatment alternative and a water end use alternative would also be selected. The no-action and containment alternatives will not require associated water treatment or end use alternatives.

Although chromium is above the federal primary drinking water standard in portions of the aquifer, the extent of the chromium contamination is not precisely known at this time. Therefore, treatment of the chromium contamination will be addressed in the final remedy. In the interim, all water extracted from the aquifers will be blended and then treated for VOC's and discharged to the appropriate end use location. This discharge will meet all federal primary drinking water standards for all contaminants, including chromium since the water containing chromium will be blended with water free of chromium. This is possible since the volume of water being extracted and treated creates a stream that lowers the chromium concentration to acceptable levels for the interim period. This treatment scheme is only an interim solution, and all contamination will be fully addressed in the final remedy.

GROUNDWATER ALTERNATIVES

The groundwater alternatives are:

- o No action
- o Containment of the contaminated groundwater by use of a slurry wall extending to the Middle Fine-Grained Unit and surrounding a range of areas within Section 16
- o Extraction of contaminated groundwater from four potential areas. These areas were chosen based on location of contaminant disposal and extent of groundwater contamination.



- Extraction of groundwater from Subunit A within the Upper Alluvial Unit beneath source areas at the GAC facility only.
- Extraction of groundwater from Subunit A within the Upper Alluvial Unit beneath source areas at the GAC and PGA facilities.
- Extraction of groundwater from Subunit A beneath all of Section 16, with the exception of the area northwest of the runway at the PGA. (Groundwater monitoring indicates levels of contaminants below ARARs in Subunit A for the area northwest of the runway.)
- Extraction of groundwater at an accelerated rate from aquifers in Subunit A beneath all of Section 16, with the exception of the area northwest of the runway at PGA. This would be accomplished by using more wells and higher pumping rates. (Groundwater monitoring indicates levels of contaminants below ARARs in Subunit A for the area northwest of the runway.)

Each extraction alternative is associated with two groundwater level of treatment alternatives that are directly related to the duration of pumping. The longer the period of pumping the more pore volumes of groundwater in the capture zone will be removed, thus the greater the cleansing of the aquifers. The groundwater rehabilitation alternatives for Subunit A of the Upper Alluvial Unit are:

- o Removal until water from monitoring wells is of a quality that meets ARARs
- o Removal until levels of VOC's in water from monitoring wells are below detection limits, which is the background quality of groundwater in the area

WATER TREATMENT TECHNOLOGIES

The possible technologies identified to treat water are:

- o Air stripping
- o Activated carbon
- o Reverse osmosis
- o Distillation
- o Critical fluid extraction
- o Liquid-liquid extraction
- o Photolysis
- o Aerobic biological treatment
- o Anaerobic biological treatment
- o Steam treatment
- o Wellhead treatment

WATER END USE ALTERNATIVES

The water end use alternatives are:

- o Reinjection
- o Surface discharge

The possible uses identified are:

- o Reinjection up to 2 miles from the site in a manner that will not have any deleterious effect on the remedial action
- o Discharge to the City of Goodyear
- o Discharge to the Agua Fria River
- o Discharge to GAC
- o Discharge to Arlington Canal Co.
- o Discharge to Buckeye Irrigation District
- o Discharge to City of Avondale
- o Discharge to City of Phoenix
- o Discharge to Cotton Tree Apartments
- o Discharge to Estrella Golf Course
- o Discharge to Goodyear Farms, Inc.
- o Discharge to Litchfield Park Service Company
- o Discharge to Maricopa County WCD
- o Reinjection for plume control
- o Discharge to Roosevelt Irrigation District
- o Discharge to Salt River Project
- o Discharge to St. Johns Irrigation District
- o Discharge to Valley Utilities Company
- o Reinjection at Unidynamics

SCREENING OF ALTERNATIVES

As promulgated under CERCLA and SARA, remedial actions are those responses to releases that are consistent with a permanent remedy to prevent or minimize the release of hazardous substances, pollutants, or contaminants so they do not migrate to cause substantial danger to present or future public health or welfare or the environment. SARA, Sec. 121, states further, "Remedial actions...shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released to the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant, or contaminant." SARA also states that remedial actions should be favored that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available.

Alternatives are screened based on their ability to meet the above-stated requirements and to meet the objective of the operable unit. The objective is to control the migration of contaminants within the Section 16 boundaries while being consistent with the final remedial action for the entire site.

GROUNDWATER ALTERNATIVES

The no-action and containment alternatives must be evaluated by law and were retained for later evaluation.

The pumping alternatives were evaluated based on their ability to clean up the targeted Section 16 area. Table V-1 summarizes the findings.

Table V-1
AREAL EXTENT OF PUMPING ALTERNATIVES

<u>Pumping Alternative</u>	<u>Subunit</u>	<u>Target Cleanup Area (acres)</u>	<u>Gallons per Minute</u>	<u>Relative Area (percent of largest target area)</u>
GAC	A	120	200	24
GAC and PGA	A	325	250	65
Section 16	A	500	300	100
Section 16-- Accelerated	A	500	1,200	100

Pumping Alternative GAC would not adequately protect the downgradient groundwater sources by covering only 24 percent of Subunit A. Since there are high levels of contamination in Subunit A throughout the Section 16 area, it is reasonable to provide the most efficient means of removing as much contamination as possible from the entire area. For this reason the GAC alternative was dropped from further consideration. The remaining pumping alternatives were evaluated in detail.

TREATMENT ALTERNATIVES

Table V-2 presents an evaluation of the technologies for VOC removal and screens out those that are not applicable. Air stripping and activated carbon adsorption were retained for detailed evaluation. The other technologies identified were dropped from further consideration for a variety of reasons

Table V-2
SCREENING OF VOC REMOVAL TECHNOLOGIES
SECTION 16 ROD

Process Description	State of Development	Ability to Meet Discharge Standards	Performance Record	Relative Costs		Waste Streams	Additional Comments	Retained for Further Analysis
				Capital	Operation			
Air Stripping	Commercial	Capable of VOC removal exceeding 99.9 percent	Excellent	Low	Low to Moderate	Air exhaust (can be carbon treated)	Commonly used for removal of VOC's at low concentrations	Yes
Activated Carbon Adsorption	Commercial	Capable of VOC removal exceeding 99.9 percent	Excellent	Low	Moderate to High	Carbon containing organics requires regeneration or replacement	Relatively poor carbon utilization for treatment of streams with very low organic concentrations	Yes--useful for vapor and aqueous phase VOC removal
Reverse Osmosis	Commercial	Relatively poor performance for VOC's	Poor for VOC removal	High	High	Produces a concentrate stream that requires additional treatment	Generally used for removal of salts and high molecular weight organics	No--poor performance for VOC removal
Distillation	Commercial	Capable of achieving very high VOC removal	Good on high concentration streams; not appropriate for low concentration streams	Moderate	Very High	Exhaust containing organics	Generally used for treatment of concentrated streams where high degree of separation is required	No--not appropriate for low levels of contaminants
Liquid-Liquid Extraction	Limited Commercial	Unknown--polishing is usually required	Good, but ability to meet discharge requirements is unknown	High	Very High	Solvent with extracted organics	Produces a solvent stream with organics that requires additional treatment; requires use of potentially hazardous solvents	No--ability to meet discharge requirements is unknown
Critical Fluid Extraction	Limited Commercial	Unknown--although unlikely to reduce below 100 ppb	Limited--few large-scale applications	Very High	Moderate to High	None	None	No--poor performance for this application
Photolysis	Limited	Unknown	Limited--complete conversion unlikely	Unknown	None	May produce more harmful byproducts; some applications require very long residence times	None	No--lack of development, performance
Aerobic Biological	Commercial	Some compounds not readily biodegradable	Variable performance for VOC's	High	High	Sludge produced that requires disposal	May not be stable, susceptible to shock, temperature-dependent, acclimation is important	No--variable performance
Anaerobic Biological	Commercial	May not consistently meet standards	Variable performance for VOC's	High	High	Sludge produced	May not be stable, susceptible to shock, temperature-dependent, acclimation is important	No--variable performance
Steam Stripping	Commercial	Capable of VOC removal exceeding 99.9 percent	Excellent	High	High	Air exhaust	Not used for this type of application	No--not demonstrated for removal of low concentrations of VOC's
Wellhead Treatment	Commercial	Variable depending on process	Variable depending on process	Variable depending on	Variable depending on	Variable depending on process	Variable depending on process	No--institutional constraints with airport management

including poor, variable, or unproven performance, institutional and management constraints, or inapplicability to expected contaminant concentrations. Chapter 7 of the Section 16 Operable Unit Feasibility Study provides the methodology for the screening of treatment alternatives.

WATER END USE ALTERNATIVES

Based on water quality, potential interest by end users, and future water requirements of end users, the water from Subunit A was screened, with the results shown in Table V-3. Because of the high levels of TDS in Subunit A (about 3,900 ppm as compared to the secondary MCL of 500 ppm), water from this subunit can only be used for reinjection after treatment as it cannot be used for drinking or irrigation purposes. There are no other suitable uses for this water.

Table V-3
SUMMARY OF SCREENING OF
WATER END USE ALTERNATIVES

<u>Use</u>	<u>Subunit A</u>
Agricultural	Eliminated
Industrial	Eliminated
Municipal	Eliminated
Recreational	Eliminated
Groundwater Recharge ^a	Retained
Surface-Water Discharge	Eliminated

^aRetained for reinjection into Subunit A only.

In summary, the only end use alternative that appears to be available is reinjection.

EVALUATION OF ALTERNATIVES

The remaining alternatives are shown in Figure V-2. A short summary of the technical and economic evaluation of each alternative follows.

GROUNDWATER ALTERNATIVES

No Action Alternative

The no-action alternative would allow the groundwater contamination to spread over an ever-widening area and would

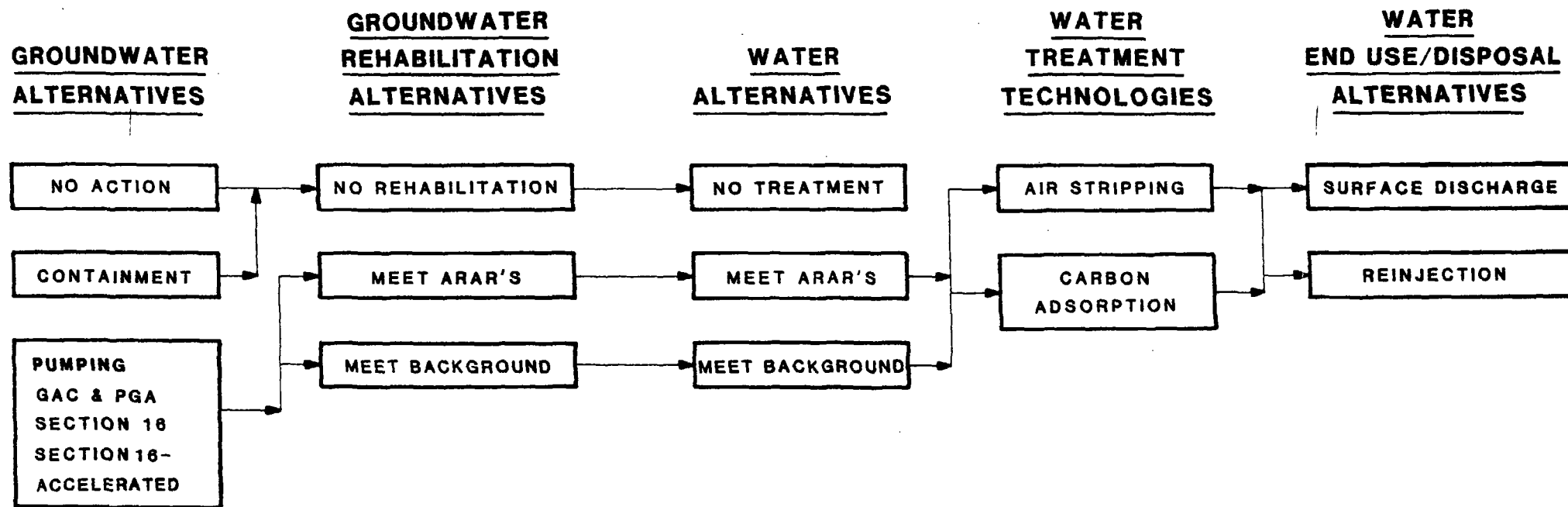


FIGURE V-2
 SELECTED REMEDIAL ALTERNATIVES
 SUBUNITS A AND B/C
 PHOENIX-GOODYEAR AIRPORT
 SECTION 16
 W63602.R4

likely have continuing adverse environmental and health consequences. These include exposure of carcinogens and other harmful contaminants through ingestion of water and soil and inhalation of soil gas and gas released from pumped groundwater.

Containment Alternative

The containment alternative will accomplish the purpose of isolating contaminants in the contained area for some period of time but would not accomplish the objective of permanently reducing waste volume or toxicity. Institutional controls would be necessary to prevent usage of contained groundwater in the future. A containment wall could be constructed to surround GAC and PGA, or all of Section 16. They have been demonstrated at numerous areas to contain groundwater under saturated conditions; however, there is no guarantee of continuous or permanent containment. The useful life of containment walls is unknown, but is expected to be more than 100 years. Containment walls as deep as 325 feet have been constructed, but with great difficulty. If a containment wall were to be constructed at this site, it would take about 2 to 3 months to build around the GAC and PGA area, or about 9 to 12 months to build around the Section 16 area. No significant safety hazards are expected during construction. If after construction the containment wall failed, there would be a threat to public health and the environment as contamination moves offsite and pollutes water supplies. Containment walls of the depth required at the PGA site are difficult to construct, and cost estimates for this alternative range from \$111 million to \$148 million, making it an extremely expensive alternative. It cannot be guaranteed that contaminants would be permanently contained within slurry walls.

Pumping Alternative

The pumping alternatives also accomplish the objective of stopping migration of contaminants in Section 16. When coupled with treatment, they also will reduce the volume, mobility, and toxicity of the groundwater. Pumping to extract contaminated groundwater would prevent migration of contaminants from the chosen pumping area. This technology has been demonstrated to be successful in other areas. However, aquifer rehabilitation estimations are based on hydrogeologic principles and regional flow characteristics. There is some uncertainty as to the time required for rehabilitation due to limited knowledge of the stratigraphy. Analysis of water samples from monitoring wells for contaminant levels will indicate aquifer cleanup. The period estimated for cleanup for Subunit A under GAC and PGA is 57 years, for Section 16, 82 years, and for Section 16--accelerated, 37 years. Pumping rates for these alternatives are found in

the Operable Unit Feasibility Study. Operation is relatively simple and is not expected to significantly affect the alternative's reliability. It is likely that during the remedial action, some components will require maintenance or replacement. No impediments to well construction are foreseen, and no significant safety hazards are expected during construction. If pump failure occurs, there would be no release of contaminants that could pose a threat to public health or the environment. Table V-4 summarizes the capital costs associated with these options.

Table V-4
COST EVALUATION OF EXTRACTION AND MONITORING WELLS

Item	Cost		
	Pumping GAC and PGA	Pumping Section 16	Pumping Section 16-ACC
Extraction Wells and Pumping	\$110,000	\$275,000	\$600,000
Monitoring Wells	<u>60,000</u>	<u>150,000</u>	<u>360,000</u>
Total	\$170,000	\$425,000	\$960,000

TREATMENT ALTERNATIVES

Both air stripping and activated carbon adsorption achieve the desired goal of reducing volume and toxicity of the groundwater sufficiently to meet the applicable and appropriate requirements and will likely exceed these requirements. Treatment of contaminated groundwater, either by air stripping or the use of granular activated carbon, has been shown to be very effective with removals of organic often exceeding 99.9 percent. These processes are relatively predictable, and they have been used successfully at a number of CERCLA sites. Equipment is relatively easy to operate once initial adjustments have been completed. Operator training will be required. Occasional attention for adjustment, monitoring, and testing will be required. With industrial-grade components and regular preventive maintenance, process integrity should be 10 years or more. Scaling of air stripping tower internals has been a problem at some sites. A small amount of an anti-scalant, such as hypochlorite, would be required to remedy this.

Numerous vendors are available to produce the process components. Conventional materials for construction are required. All equipment items can be shop-fabricated and skid-mounted, making field erection easier. Construction of either process could be completed within one year. The startup period may take several days. Catastrophic failure of components are unlikely, and any threat to public health and the environment are relatively low. Air emission controls will be placed on the air stripping towers for two reasons. First, SARA states that a remedy should significantly reduce the toxicity, mobility, and volume of contaminants. By just removing VOC's from water and placing them into the atmosphere, none of these objectives are satisfied. In addition, Maricopa County Air Pollution Control Board requires that all new plants with air emissions "will adequately dilute, reduce, or eliminate the discharge of air pollution to adjoining property." This requirement is also known as reasonably achievable control technology (RACT), and in this case, RACT is air emissions controls such as activated carbon adsorption or thermal degradation. The costs associated with each treatment alternative are summarized in Table V-5.

END USE ALTERNATIVES

As discussed previously, in the Screening of Alternatives section, for the Subunit A water, the only viable alternative is reinjection back into the Subunit A aquifer. The number and location of reinjection wells would need to be studied.

Injection into aquifers via wells has been done successfully in the past. Operations are simple, but require maintenance from time to time. Periodic redevelopment will prevent clogging of the wells, thus maintaining the wells' ability to accept the generated flow. Redevelopment will require a temporary shutdown. Drilling and developing wells is routine, and the construction period, including construction of the conveyance system, is expected to be less than 18 months. No threats are expected to public health or the environment during construction or in the event of system failure. Costs are included in Table V-5 along with the treatment alternatives.

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Table V-5
COSTS FOR SUBUNIT A
REMEDIAL ACTION WITH WATER REINJECTION

Treatment Method	Pumping Alternative		
	GAC & PGA	Section 16	Section 16-Accelerated
CAPITAL COSTS ^a			
Air Stripping: ^b			
To ARAR	\$2,077,500	\$2,358,500	\$5,043,100
To Background	2,139,500	2,438,500	5,222,100
Granular Activated Carbon:			
To ARAR	2,032,500	2,338,700	5,226,500
To Background	2,032,500	2,338,700	5,226,500
OPERATING COSTS			
Air Stripping: ^b			
To ARAR	765,500	800,200	1,521,500
To Background	787,400	872,300	1,555,700
Granular Activated Carbon:			
To ARAR	3,532,400	4,203,900	15,085,700
To Background	3,532,400	4,203,900	15,085,700

^a Costs are shown as present worth at a 10-percent rate of return.

^b Costs for air stripping include air emission control.

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VI. SELECTED REMEDY

STATUTORY DETERMINATIONS

CERCLA and its reauthorization, known as SARA, requires that permanent reductions of contaminants through treatment be preferred over containment alternatives. It also requires that Applicable or Relevant and Appropriate Requirements (ARARs) be used to determine the treatment levels. By achieving these requirements, the selected remedy for the Section 16 Operable Unit reduces the present and future risks associated with use of the groundwater in the Section 16 area. By reducing the contaminant levels and restricting their mobility, this remedy protects both human health and environmental quality.

Table VI-1 shows the ARARs identified for the groundwater and the proposed treatment levels. In all cases, contaminant levels found in Section 16 Subunit A wells are greater than the Safe Drinking Water Act maximum contaminant levels (MCL) and the Arizona Department of Health Services action levels.

While the selected remedy satisfies the requirements for treatment and risk reduction, it does so in the most economical manner. Since Subunit A is the most contaminated aquifer, the entire Section 16 area will be treated and pumped to prevent lateral and vertical migration. Although the recommended alternative at the beginning of the public comment period called for limited pumping and treatment of water from Subunit B/C this water is much less contaminated and will be pumped and treated as part of the current industrial practice until the final remedy is chosen next year. This reduces pumping and well costs while capturing the most contaminated water.

Of the proven technologies, air stripping proved to be the most economical treatment method available, both for capital and operating costs. It will also reduce residual wastes to a minimum.

Reinjection proved to be the only viable alternative for Subunit A water.

By reducing migration of contaminated groundwater outside of Section 16 and permanently reducing the levels of contamination in Section 16, the risks associated with use of the water are reduced to acceptable levels. The selected remedy satisfies the requirement of reducing the mobility, toxicity, and volume of contaminated water. It does so by using treatment technology to the maximum extent practicable and does so in a cost-effective manner.

Table VI-1
STATE AND FEDERAL
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS^a AND OTHER CRITERIA
(concentrations in ppb)

Compound	SDWA MCL	SDWA MCLG	Proposed MCL	Proposed MCLG	AWQC Drinking Water Only	ADHS Action Level	Proposed DW Treatment Level
Trichloroethylene	5	0				5	5
1,1,1-Trichloroethane	200	200				200	200
1,1-Dichloroethylene	7	7				1	7
Perchloroethylene					0	3	3
Trans-1,2-dichloroethylene			70				70
Carbon tetrachloride	5	0				1	5
Chloroform ^b					0.5		0.5
Chromium	50			120			50
Arsenic	50			50			

^a Clean Water Act requirements will be determined during NPDES review.

^b Source is not a byproduct of municipal water supply chlorination.

NOTES: ADHS--Arizona Department of Health Services
AWQC--Ambient Water Quality Criteria
MCL---Maximum Contaminant Level
MCLG--Maximum Contaminant Level Goal
SDWA--Safe Drinking Water Act
DW--Drinking Water

Sources: U.S. EPA 1986. Public Health Assessment Manual
ADHS 1987. S. Eberhart

DESCRIPTION

The selected alternatives for the Section 16 Operable Unit are:

o Groundwater

Water from Subunit A will be drawn from the entire Section 16 area until contaminant levels are reduced to meet ARARs, and the water treated to meet ARARs. Water from Subunit B/C will continue to be pumped by Loral Corporation and the Phoenix-Goodyear Airport and closely monitored. Currently, GAC-2 is pumped about 50 percent of the time at 1,000 gpm during the irrigation season and about 15 percent of the time during the winter. GAC-3 is used for standby fire protection and not normally pumped. GAC-4 has very little usage. PLA-2 is pumped for 2 to 3 hours per day at a rate of about 450 gpm. Pumping from those wells may be altered to optimize plume containment and removal.

o Treatment

Air stripping towers will be used to remove the VOC's from the groundwater. Emission controls such as activated carbon units will be used to treat the air effluent.

Contaminated water will be pumped out of the ground and routed via pipelines to the treatment plant. There the water will be sprayed down as air is pumped up a packed column to remove VOC's. Air flowrate, column diameter, and packing depth will be designed based on maximum contaminant levels and organic volatilities. Stripped water will then be reinjected into the aquifer at a location that will not adversely affect the groundwater flow to the supply wells, or adversely affect contaminant flow in the groundwater system.

Air containing the stripped organics will be treated in a bed of granular activated carbon to reduce air emissions. When the carbon becomes saturated with organics, it will require regeneration or proper disposal. At other sites, this has typically been done once or twice a year.

o End Use

Reinjection is the preferred end use for the water from Subunit A.

It is expected that treatment facilities for Subunit A will be in operation for a period of 82 years.

Additional study is required to determine if further water treatment is necessary to prevent scaling and biological growth in the air strippers, the proper location of the reinjection wells.

By capturing the contaminant plume in Section 16, this selected remedy will accomplish the objective of the Section 16 Operable Unit, which is to stop migration of contaminants beyond Section 16 in Subunit A and from entering Subunit B/C. It will reduce further deterioration of the aquifer outside of Section 16 and reduce the volume and toxicity of the contamination in Section 16. It also fulfills the statutory preference for permanent solutions at Superfund sites.

The selected remedy, as proposed, will meet all enforceable federal and state requirements for water quality. The resulting saturated carbon from the air emission control equipment will either be regenerated or disposed of in a safe manner at an approved RCRA facility.

RD/R52/024

Appendix A
INDEX OF ADMINISTRATIVE RECORD

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Revised March 15, 1988

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RD/R94/029

Appendix B
RESPONSIVENESS SUMMARY

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PHOENIX-GOODYEAR AIRPORT
SECTION 16 OUFS

OVERVIEW

During the public comment period for the Public Comment Operable Unit Feasibility Study from June 2 through July 2, 1987, EPA received comments on the recommended remedy for the cleanup of Section 16 of the Phoenix-Goodyear Airport site. Comments were received from persons residing or doing business in that area.

Most of the comments were of an editorial nature or addressed issues that are not fundamental to EPA's selection of a remedial action; however, the OUFS will be reissued to reflect all comments noted, and the remedial design will respond to comments as a part of this record of decision. This responsiveness summary reflects the changes made in the OUFS as a result of comments received and indicates where those changes were made.

One issue that is fundamental to the selected alternative is the appropriateness of pumping aquifers in Subunit B/C at greater than current rates while still gathering information on these subunits. It has been decided to not expand the pumping in Subunit B/C until additional data pertaining to the aquifers and contaminants in this Subunit become available, and an alternative selection can be reevaluated during the final remedy. Final selection, including extraction and injection well placement and pumping rates for Subunit A, will be determined during the remedial design period.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

FROM PAMELA SWIFT, TOXIC WASTE INVESTIGATIVE GROUP

1. Question/Comment: I want to see some health studies done in this area. Response: As part of the overall remedial investigation/feasibility study (RI/FS) an endangerment assessment (EA) will be conducted. The EA will consist of a public health evaluation and environmental assessment. The Agency for Toxic Substances and Disease Registry will review the EA as well as conduct a health impact study prior to signing of the final record of decision, which is planned for summer 1988. See page 3-21 of OUFS.

FROM SUNCOR DEVELOPMENT COMPANY

1. Question/Comment: We have a need for irrigation water for our farm crops and would like to use the treated ground-water if it becomes available for irrigation purposes.

Response: Reinjection is the selected alternative for Subunit A water because of the high TDS levels that make this water unsuitable for irrigation. See pages 5-6 and 8-12 of OUFS.

FROM CRANE, UNIDYNAMICS

1. Question/Comment: Consideration should be given to the possibility of conveying water pumped from wells in the Unidynamics area to the OU for treatment and subsequent end-use, precluding the need for a separate treatment facility in the Unidynamics area. Response: The overall RI/FS will consider this configuration. The treatment plant will be designed in a modular fashion to allow expansion for increased capacity.

2. Question/Comment: Hydraulic connection of Subunits B and C pertain only to the PGA area. A good hydraulic connection between the two units has not been shown in the Unidynamics area. Response: See pages ES-1 and 2-1 of OUFS.

3. Question/Comment: The public health evaluation pertains to the entire Superfund study area, including PGA, GAC, and Unidynamics. Should it be modified to address only PGA and GAC for this document? Response: The public health evaluation portion of the OUFS, Chapter 3, was modified to address only PGA and GAC. See Chapter 3 of OUFS.

4. Question/Comment: Where appropriate, text and figures should be modified to reflect the purchase of Goodyear-Westinghouse property by SunCor. Response: See Chapter 2 of OUFS.

5. Question/Comment: On Figure ES-2, steam stripping is indicated under water treatment alternatives but is not addressed in the text. Response: Steam stripping is addressed in Table 7-2. See Table 7-2 of OUFS.

6. Question/Comment: On page 1-1, 5th paragraph, 1st sentence, it may be more appropriate to say "...acceptable level of contaminants in Arizona ground water." Response: See page 1-1 of OUFS.

7. Question/Comment: On page 1-1, 5th paragraph, 4th sentence, refer to treatment levels in aquifer and extracted water. Response: See page 1-1 of OUFS.

8. Question/Comment: By page 1-3, the PGA and Unidynamics areas have not been defined. A map prior to this may help clarify. Response: See Figure 1-1 of OUFS.
9. Question/Comment: Are the estimated contaminant concentrations presented on Figures 2-3 and 2-4 mode, mean, or median values? Response: See Figures 2-1 and 2-2 of OUFS.
10. Question/Comment: PLA is used to designate wells. Should it be said that PLA = PGA? Response: Although the airport name has been changed, the well designations have not been changed.
11. Question/Comment: Is TDS concentration of 3,900 ppm in Subunit A an average for all measurements? Response: Yes. See page 3-2 of OUFS.
12. Question/Comment: Unidynamics does not, and never has had, a separate production well for its water supply. The City of Goodyear has always provided water to the facility. Response: See Chapter 2 of OUFS.
13. Question/Comment: For comparison purposes, it would be easier if the zip patterns in the legends of Figures 3-1 and 3-2 were consistent. Response: See Figures 3-1 and 3-2 of OUFS.
14. Question/Comment: On page 5-2, various alternatives could be linked more directly to Figure 5-1 by labeling each bullet with abbreviations from Figure 5-1, such as GAC, GAC & PGA, Section 16, etc. Response: See page 5-2 of OUFS.
15. Question/Comment: On Figure 5-1, steam stripping is listed but never discussed in the text of that section. Response: Steam stripping is discussed in Table 7-2. None of the screened out alternatives are discussed in the text. See Table 7-2 of OUFS.
16. Question/Comment: On page 5-5, what is Storm Treatment? Response: A typographical error--should have been Steam Treatment. See page 5-5 of OUFS.
17. Question/Comment: On page 7-17, line 18, "backing" should be packing. Response: See page 7-17 of OUFS.
18. Question/Comment: On page 7-26, under General Assumptions, will monitoring wells, as well as influent and effluent wells, be sampled for analysis on a weekly basis? Response: This frequency was used as a cost basis. The actual sampling frequency will be determined during the remedial design phase.

FROM EPA, AIR TOXICS OFFICE, AMD

1. Question/Comment: We recommend that you consider several design and operating factors for the stripping towers during the design stage of the project. Response: The design and operation factors have been received from your office and will be considered during design.

2. Question/Comment: Although ambient air concentrations in the vicinity of the stripping tower would be expected to be low, you may want to consider some initial ambient air monitoring. This has been performed at other Superfund sites to demonstrate to interested parties that concentrations are in fact as low as expected. Response: Air sampling will be added to OU operations.

FROM U.S. ARMY CORPS OF ENGINEERS, OMAHA DISTRICT

1. Question/Comment: Subunit B/C should be evaluated more carefully in light of recent and forthcoming data. ReInjection of treated effluent for plume control should be carefully evaluated and considered. A technical memo outlining new information would be helpful in making decisions concerning remediation of Subunit B/C. Response: The OUFS stage is considered to be a 10-percent design. It is conducted to compare several alternatives that can provide an expeditious response to the contamination hazard while not being inconsistent with the final remedy. Deep wells being installed at this time will provide additional data to be incorporated into the design. It has been determined that the best approach to Subunit B/C is to allow Loral Corporation and the airport to continue pumping as they currently do, and conduct an extensive groundwater monitoring program.

2. Question/Comment: Information available at the time this OUFS was prepared does not adequately define the contaminant plume and is insufficient to design an extraction scheme. Work in progress may be sufficient; however, additional work may be required during the design phase. Bench and/or pilot scale treatability testing will be necessary to properly design the proposed treatment system. Response: Comment will be noted in final OUFS. Bench and/or pilot scale testing is planned for final design of the air stripping process.

3. Question/Comment: On page ES-1, the word "minor" in sentence "Other VOC's have been identified sporadically and in minor concentrations..." is misleading as it seems to indicate that these levels are inconsequential when in fact some exceed regulatory standards. See Chapter 3, Table 3-2. Response: See page ES-1 of OUFS.

4. Question/Comment: On page ES-2, 8th bullet, clarify that this refers to treated groundwater. Response: See page ES-2 of OUFS.

5. Question/Comment: On page ES-5, the definition given for rehabilitation is inaccurate. Response: See page ES-5 of OUFS.

6. Question/Comment: On pages ES-5 and 6, rehabilitation and level of treatment seem redundant. Clarify the distinction between these two. Response: Rehabilitation refers to aquifer treatment. Level of treatment under Treatment Alternatives refers to treatment of extracted groundwater.

7. Question/Comment: On page 2-1, 4th paragraph, clarify that Unit A should be Subunit A. Response: See page 2-1 of OUFS.

8. Question/Comment: On page 2-1, 4th paragraph, you say, historically, groundwater flow direction under Section 16 is to the southwest. However, flow has been more westerly than southwesterly in the UAU. Clarify. Response: There are not enough data to conclusively state whether the flow is more southwesterly or west by southwesterly due to occasional fluctuations.

9. Question/Comment: On page 2-2 there is reference to PGA well No. 3 as having the highest level of TCE. The location of this well should be indicated on appropriate drawings. Response: The well location is indicated as PLA3 on Figure 2-3.

10. Question/Comment: Clarify what contaminant concentrations represent in Figures 2-2 and 2-3. Response: They represent single event values.

11. Question/Comment: The historical waste disposal practices section does not provide a comprehensive understanding of past chemical use and disposal practices. More investigations should provide a clearer picture; however, a detailed and quantitative determination will probably not be possible. The information presented in this report has been compiled from many sources and may be accurate for certain periods of operations only. The nature of the information--verified from more than one source, secondary, etc.--should be identified. Response: Comment will be noted in final OUFS. EPA is continuing to try to determine the history and source(s) of contaminants at the site.

12. Question/Comment: Re page 2-9, 1st paragraph, available information indicates that most of the Goodyear facility was owned by Southwest Cotton Company/Goodyear Tire/

Aircraft. Several small parcels, which apparently consisted of a portion of the building referred to as Building/ Hangar 6 and several very small areas, were purchased by the Government in 1943. A greater portion of the Goodyear facility was purchased by the Government in 1947. The entire "plant" area (present facility) was quitclaimed to Goodyear Aircraft in 1950. Response: See page 2-7 of OUFs.

13. Question/Comment: Re page 2-11-14, it should be clarified that the entire aircraft was usually not covered with the protective coating, only key sections of the aircraft that would be prone to moisture-induced corrosion s.a. openings, fabric surfaces, etc. Stripping consisted of peeling of the coatings manually and not by use of chemical strippers, except for early coatings on windows which were removed with ammonia or alcohol. Latex materials were used in protective coatings for some portion of the total time of operations. Coatings used included "liquid envelope" and later "spraylat."

"Gunk" was not used in stripping of protective coatings and was probably used more extensively for engine degreasing or to degrease metal surfaces prior to preservation, again a limited portion of the airplane. Also note that many airplanes stored were fabric and dope structure.

While the Airport property was transferred to the City of Phoenix in 1968, Navy operations ceased prior to 1 July 1967.

Response: See pages 2-9 through 2-14 of OUFs.

14. Question/Comment: Re page 2-14, more recently acquired information indicates that most drums and other chemical containers were returned to suppliers for reuse and that little if any local disposal of containers occurred.

Response: See page 2-12 of OUFs.

15. Question/Comment: Re page 2-15, drawings ("as-built") on file with the City of Phoenix should be consulted for details on the washrack and drainage system design and construction and these discussions corrected/clarified appropriately. The washracks still exist, much as constructed.

Response: See page 2-13 of OUFs.

16. Question/Comment: Re page 2-15, describe sources of information on historical activities, such as statement concerning air flotation not being used. Was source directly involved with treatment plant operation, i.e., did source have direct knowledge? Response: Historical information came from the Source Verification Report, Ecology and Environment, Inc. January 1986. See page 2-13 of OUFs.

17. Question/Comment: Re Table 2-4, it should be made clear that this table does not indicate either relative or absolute amounts of chemicals used. Response: Unnecessary due to no mention of amounts.

18. Question/Comment: Re page 5-2, for clarity, the initial paragraph under GROUNDWATER ALTERNATIVES should include pumping as well as no-action and containment, then the pumping alternatives detailed. Response: See page 5-2 of OUFS.

19. Question/Comment: Re page 5-2, area NW of runway should be excluded for pumping Subunit B/C based on no concentrations reported above 1 ppb in that area. Response: The decision to include this area was not based on data, but on suspected contamination. New data will provide an opportunity for reevaluation.

20. Question/Comment: Re Chapter 6, information available at the time this OUFS was prepared does not adequately define the contaminant plume and is insufficient to design an extraction scheme. Work in progress may be sufficient or additional work may be needed during the design phase. Response: See previous response.

21. Question/Comment: Re page 6-1, monitoring is usually considered part of the no-action alternative. Response: See page 6-1 of OUFS.

22. Question/Comment: Re page 6-3, a discussion of probable molecular diffusion rates into "dead" zones is needed. These areas would be subject to reverse gradients as cleanup continues. Since it is unlikely that significant volumes of contaminant would be tied up in these zones, this is a superfluous discussion. Sorbed contaminant soil particles in dewatered zones is of greater concern. Response: The diffusion of contaminants into low permeability units can be an important process. Such units can act as long-term sources for contaminants, thus delaying total cleanup. See, for example, Gilliam, et al, (1984), An Advection-diffusion Concept for Source Transport in Heterogeneous Unconsolidated Geological Deposits, Water Resources Research, Vol. 20, No. 3, pp. 369-378. As noted, sorbed (or otherwise slowly mobile chemicals) in the vadose zone can be another long-term source of contaminants. See page 6-3 of OUFS.

23. Question/Comment: Re Table 6-2, the choice of 10 pore volumes for extended cleanup gives an unrealistically conservative estimate of cleanup time. Note difference between values given on page 9-7 and Table 6-2. Response: The time required for cleanup is not known. For the purposes of comparing alternatives, five pore-volumes were used.

24. Question/Comment: Re Figure 6-4, it is evident that capture zones greatly exceed the targeted cleanup area under this alternative. Note "stagnant" zones near divides between cones - the "accelerated" nature is not apparent. Response: This alternative was presented to provide a wide choice of cleanup. Appropriate capture zones will be developed during the remedial design activities.

25. Question/Comment: Re Figure 6-6, 7, 8, these scenarios should be reconsidered in view of more recent monitoring well data. Response: All pumping alternatives will be reevaluated with new data during design.

26. Question/Comment: Re page 6-21, it is not clear if the combined effect of contaminated groundwater withdrawal and normal seasonal pumping will impact nearby wells. Please clarify. Response: There is no seasonal pumping of Subunit A. Water levels in Subunit A will be maintained in accordance with remedial design parameters. See page 6-21 of OUFS.

27. Question/Comment: Re page 6-22, it is not clear if declines in Subunit A water levels (because of the proposed extraction of contaminated water) has been considered in estimating transmissivity for the subunit and hence for performance of the extraction wells. (Efficiency is reduced as drawdown occurs.) Please clarify. Response: Drawdown effects were considered. A typical guideline of maintaining drawdown in the pumping well at less than two-thirds of the available drawdown was followed. Drawdown in most of the Subunit A zone is expected to be less than 20 percent of the saturated thickness. See page 6-22 of OUFS.

28. Question/Comment: Re page 6-24, for the monitoring wells, it was assumed that three per extraction well was sufficient. This was apparently applied across the site regardless of location. In areas of numerous existing wells or densely spaced extraction wells, this number of new wells may not be necessary. More detailed analyses should be performed for actual numbers of monitoring wells needed. Response: Three wells were chosen for cost estimating purposes. A more detailed analysis will be done during design.

29. Question/Comment: Re page 7-7, the OUFS should include an expanded discussion concerning the necessity of pilot testing. Pilot testing could determine pretreatment requirements (due to high TDS and sulfide levels), evaluate or confirm the mass transfer efficiency of a particular packing, verify removal efficiency, verify mathematical model, clarify off-gas pretreatment requirements and design parameters, possible scaling problems, anti-scaling problem design considerations, etc. Response: Bench testing will be conducted during design.

30. Question/Comment: Re page 7-16, chemical feed system design and potential problems associated with scaling need to be addressed. This is particularly important with the high concentrations of TDS and sulfate in Subunit A. With the high concentrations of sulfate, there is a good possibility of a manganese sulfide precipitation, this would probably require removing the filter media for cleaning of the precipitate. An estimate on the frequency and approximate down time in the system operation should be analyzed. These factors should be addressed briefly in the OUFs and in detail during pre-design and design. Response: Research on this factor is currently being done by GAC. This will be addressed in detail during predesign and design.

31. Question/Comment: Re page 7-16, onsite versus offsite cost comparisons should be analyzed for carbon regeneration. Has the cost of an onsite or the operational cost of offsite carbon regeneration been incorporated into the estimate? Response: Onsite regeneration is part of the carbon adsorption alternative. The onsite costs included significant fluctuations as to overlap costs for offsite regeneration.

32. Question/Comment: Re page 7-17, indicate how/where the disposed scale cleaning solution could be disposed of and the cost associated with that disposal. Response: See previous response.

33. Question/Comment: Re page 7-17, has the impact (environmental and O&M considerations) of an influent pipe rupture been considered? Response: A detailed risk assessment will be conducted during design.

34. Question/Comment: Re page 7-18, carbon usage could be evaluated in pilot study. Response: It will be.

35. Question/Comment: Re page 7-27, the impact of the high TDS on treatment should be addressed in more detail. Impact (including impact on costs) could be significant. See also comments on pages 7-16 and 7-17. Response: See response to those comments.

36. Question/Comment: Re Chapter 8, address the advantages and disadvantages with combining the treatment and collection lines in the preferred alternatives. Also indicate the cost benefits that would be obtained by combining the treatment for Subunit A and B/C. It seems that if the treatments proposed are similar or identical that they could be combined. Response: A detailed analysis will be conducted during design. Alternatives for Subunit B/C are not included in this remedy.

37. Question/Comment: Re Chapter 8, a discussion of the potential use of reinjection for plume control should be

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included. Effluent piping costs would decrease as may overall treatment costs/time. This must be addressed--if not in the OUFS, then in the OU predesign phase. Response: See page 8-15 of OUFS.

38. Question/Comment: Re page 8-5, include, if available, the water quality in Subunit B/C. This information will be helpful in determining water quality of the influent to the air stripper. Response: See Table 8-2 of OUFS.

39. Question/Comment: Address items which should/could be considered for implementation/construction with the OU facilities which would facilitate implementation of the final remedy--s.a. to lay additional piping, providing space for additional stripping towers, etc. Response: A detailed analysis will be conducted during design.

40. Question/Comment: Re page 9-13, reinjection wells will undoubtedly need rehabilitation and/or replacement. (Cost estimates should reflect this.) Response: This will be addressed during predesign and design.

41. Question/Comment: There is no discussion of the fine tuning of the design through testing during the construction phase and use of wells during the startup and operation phases. This need not be addressed in detail at this point but should be addressed during the subsequent project phases. Response: This will be addressed during predesign and design.

FROM ARIZONA DEPARTMENT OF WATER RESOURCES

1. Question/Comment: The Middle Fine-Grained Unit at the site is actually 800 to 1,000 feet thick at the site, and the Lower Conglomerate Unit is thicker than 1,000 feet. Response: See pages ES-1 and 2-1 of OUFS.

2. Question/Comment: The PLA well No. 3 is also referred to as the PGA well No. 3. This is inconsistent. Response: The well designations have never been changed. The correct designation is PLA well No. 3.

3. Question/Comment: There should be some mention of the recent purchase of the Goodyear Aerospace Corp. facility at the site by the Loral Corporation. Response: See page 2-9 of OUFS.

4. Question/Comment: Regarding current conditions and land use, agricultural land use would seem to be more related to industrial-based mixed use than recreational-based mixed use. Response: See page 3-4 of OUFS.

5. Question/Comment: General response actions and technologies: Justification for applicable response actions should make some statement to the effect that there are technologies which have been proven to be effective in the past. Also, rejection of in situ treatment should state that the time required to effect cleanup is excessive. Response: See Table 4-2 and Chapter 7 of OUFS.

6. Question/Comment: The Arizona Department of Water Resources has jurisdiction over contamination problems and the proposed remedial alternatives impacting the ongoing water conservation efforts within the Phoenix Active Management Area. Response: See page 6-1 of OUFS.

7. Question/Comment: Regarding RESSQ modeling, a statement should be made to the effect that, due to the uncertainties inherent in the RESSQ model, final remedial alternatives will be determined with the results of the numerical modeling efforts currently underway. Response: Remedial alternatives will be addressed in detail during the remedial design period, including placement of wells and pumping rates. This will take into account all new data and models which are available. See page 6-4 of OUFS.

8. Question/Comment: On page 9-1 under PUMPING; suggest replacing the word "significantly" with "sufficiently." Response: See page 9-1 of OUFS.

FROM GOODYEAR TIRE AND RUBBER COMPANY

1. Question/Comment: The Goodyear Tire and Rubber Company submitted its comments in the form of a preferred alternative report. Their preferred alternative is to treat all groundwater in Subunit A in Section 16 using air stripping; however, they have offered an alternate scheme for extraction and reinjection. This alternative includes five extraction wells and nine injection wells. The injection wells would serve to recharge the aquifers of Subunit A and to provide contaminant plume control to force contaminants towards the extraction wells. Response: The use of injection wells to enhance plume recovery is not justified under the current state of knowledge at the site. Injection wells will cause an increase in the hydraulic gradient downward to Subunit B/C in the vicinity of the wells. High permeability conduits or holes in the aquitards could cause contaminants to move into presently uncontaminated areas as a result of injection. In addition, the proposed location of the injection wells is actually within the contaminated plume. Reinjection into contaminated groundwater will enhance the rate of spreading of contamination both laterally and vertically. In view of this, injection wells should be rejected at the present time for the purpose of plume

control. Additional information may become available to warrant consideration of injection wells at the time of final remedy selection.

The drawdown of groundwater levels and the pumping water levels in the wells apparently have not been calculated. This is an important consideration in designing the extraction well field.

2. Question/Comment: Goodyear also recommends that EPA delay pumping and treating Subunit B/C groundwater for the following four reasons:

- (1) The remedial investigation to define the areal extent of contamination in Subunit B/C is still ongoing. The outstanding data are essential for selecting the optimal location of Subunit B/C groundwater recovery wells and evaluating treatment alternatives. Response: EPA intends to make a final selection for remedial action in Subunit B/C when additional data are available.
- (2) Subunit B/C groundwater is pumped continuously for use by the Loral Corporation and the Phoenix-Goodyear Airport as process and drinking water. The extraction, combined with pumping Subunit A groundwater to prevent migration of contaminants, will slow or stop contaminant migration and provide some measure of cleanup to Subunit B/C groundwater. As shown by EPA in Table 6-5 of the "Public Comment Feasibility Study," Subunit A groundwater contains 95 percent of the TCE contamination in the Upper Alluvial Unit. Response: The current extraction of groundwater may or may not prevent contaminant migration. Additional monitoring wells are necessary to determine the hydraulic effect of the existing and future wells.
- (3) Adverse health effects from postponing extensive treatment of Subunit B/C groundwater will be negligible. Recently acquired data suggest that contamination in Subunit B/C is in the immediate vicinity of production wells on Loral and airport properties. The affected population is supplied with treated or carefully monitored drinking water to protect human health. EPA's Public Comment Feasibility Study states on page 3-3: "West of the City of Goodyear, most of the land is currently used for agricultural production. Some smaller areas of residential development exist outside of Goodyear, but these are several miles to the west of the city." Growth of the city is expected to be to the west. If the City of Goodyear expands

its extraction network in light of the projected population increase, the new wells are not likely to exhibit contamination, nor are they likely to become contaminated since pumping of Subunit A groundwater will halt any migration of contaminants.

Response: There is no proof that new wells to the west are not likely to be contaminated. The area downgradient of the site will need to be monitored on a long-term basis to ensure that contaminated groundwater is not being pumped and delivered to a municipal or private system.

- (4) There is a technical advantage to delaying extraction of Subunit B/C groundwater. The different aquifer characteristics of Subunits A and B/C indicate that the water level in Subunit B/C will drop much faster than that of Subunit A if the two are pumped simultaneously. Under such conditions, the potential for downward migration of contaminants will greatly increase. Pumping Subunit A alone for a period of time will lower the Subunit A water level and alleviate possible problems if a decision is made to increase pumping from Subunit B/C.

Response: Although the comment is strictly true, the fact that a vertical downward gradient has existed for many years at the site suggest that there is little advantage in delaying additional installation of wells and pumping of the B and C subunits.

3. Question/Comment: On page 2-10 of the "Public Comment Feasibility Study for Section 16 Operable Unit, dated June 1987, the text reads: "Only one of the six is currently being used as a source of drinking water, and GAC, the owner, is providing bottled water as an alternative." GAC (Goodyear Aerospace Corporation) did offer bottled water at its facility when groundwater contamination was first discovered, but has since installed a carbon adsorption/reverse osmosis treatment system to produce safe drinking water.

Response: See page 2-5 of OUFs.

4. Question/Comment: On page 2-10, Table 2-2 estimates that GAC disposed of 31,000 gallons of halogenated and non-halogenated solvents between 1949 and 1974. The only documented onsite disposal of solvents (not necessarily TCE) by GAC was a small volume placed in a lined drying bed in 1971. Because there is no sound basis for the total quantity of 31,000 gallons for the corresponding time period, Goodyear requests that the value be omitted. In addition, the footnote "a" is inappropriate for the 4,900 gallons specified for 1,1,1-trichloroethane. That volume is a documented,

offsite disposal quantity, not an approximation. Response: Volumes generated by disposal practices are currently being investigated. See Table 2-2 of OUFS.

5. Question/Comment: It should be noted on Table 2-2 that the 12 tons of chromate sludge placed in onsite disposal pits contained relatively nontoxic, immobile trivalent chromium and not hexavalent chromium. Also, when the pits were closed in 1980, a total 383 tons of soil, sludge, and fabric liner were excavated and transported to an offsite disposal facility. Response: Volumes have been removed from Table 2-2.

6. Question/Comment: Figure 2-4 on page 2-12 contains some errors and omissions in locations of legend numbers. The plant powerhouse, Circle 24, is actually adjacent to Building 16, Circle 5. The 1,1,1-trichloroethane storage tank, Circle 25, belongs in the northwest corner of Buildings 1 and 2. Circle 19 is missing from the parking lot east of Litchfield Road.

Table 2-3, the legend to Figure 2-4, also requires some correction. Items 2 and 3, Buildings 1 and 2, are currently mostly manufacturing, not offices as stated. Item 6, Building 76, was built in the 1940's, not in 1976. Item 7, Building 70, formerly was used for shipping and receiving but currently is used as storage space. Item 8 used to be a general storage building and now serves as office space; it was never used for virgin chemical storage. Item 10 is the virgin chemical storage building. Item 11, Building 50, was constructed in the 1980's and not the 1960's.

Response: See Figure 2-3 and Table 2-3 of OUFS.

FROM EPA, REGIONAL ADMINISTRATOR'S OFFICE

1. Question/Comment: Several of the proposed maximum contaminant levels are now Safe Drinking Water Act maximum contaminant levels. Proposed drinking water treatment levels have been changed to reflect those levels. Also, EPA has issued a health advisory that chloroform should not exceed 0.5 parts per billion in drinking water. Drinking water standards exceed Ambient Water Quality Criteria. Response: The new material has been received and will be incorporated. See Table ES-1 of OUFS.

2. Question/Comment: In the section that identifies ARARs, there should be consideration given to other criteria and health advisories. Response: See page 1-1 of OUFS.

3. Question/Comment: On Table 3-3, there needs to be a total cancer risk assessment for all chemicals identified.

Why is Unidynamics mentioned? 1,1-DCE is not a carcinogen.
Response: See Table 7-3 of OUFS.

FROM EPA, OFFICE REGIONAL COUNSEL

1. Question/Comment: Shouldn't containment technology be included in the surviving technologies? Response: Yes, this technology will be added. See Chapter 9 of OUFS.

2. Question/Comment: Is the DCE target level accurate? The arsenic treatment target level does not comply with AWQC. Response: The target level for DCE has been changed to reflect the new SDWA maximum contaminant levels. Arsenic will be addressed in the overall feasibility study. See Table ES-1 of OUFS.

3. Question/Comment: SARA is the Superfund Amendments and Reauthorization Act of 1986. Response: See page 1-1 of OUFS.

4. Question/Comment: For chromium the MCL is more stringent than the AWQC. Response: The correct MCL and AWQC are the same.

5. Question/Comment: On page 2-15 "floting" should be floating. Response: See page 2-13 of OUFS.

6. Question/Comment: On Table 3-3, why reference Unidynamics? Response: See Table 3-3 of OUFS.

7. Question/Comment: Are attainable removal rates of TCE 99.9% or 99.99%? Response: 99.99%. See Table 7-1 of OUFS.

8. Question/Comment: On page 7-15 the discussion of RACT is very cursory. Response: An operable unit feasibility study is considered to be a 10% design, and as such the description of control technologies is sufficient.

9. Question/Comment: In Table 7-4, it is indicated that the expected removal efficiency from subunit B/C is 94/95%. This should be noted and discussed earlier in the screening. Response: See page 7-12 and Table 7-4 of OUFS.

10. Question/Comment: Table 7-4 focuses on 10 E-6 cancer risk as removal criterion. Table 7-5 focuses on either 5 ppb or background. Does this distort the comparison? Response: The different removal requirements for meeting the various levels of cleanup has no effect on the comparison of technologies. If the required removal of contaminants to meet ARARs were also entered on Table 7-4, Air Stripping, the values would be the same as they are on Table 7-5, Activated Carbon. See Tables 7-4 and 7-5 of OUFS.

11. Question/Comment: On page 9-1, note that in situ treatment was also screened out. Response: See page 9-1 of OUFS.

12. Question/Comment: Why do you need to design and construct wells for surface discharge? Response: To extract contaminated groundwater and to monitor groundwater quality.

FROM EPA, TOXICOLOGY

1. Question/Comment: Consistent with my oral comments to you and the contractor during the second week of June of the "Draft Preliminary Public Health Endangerment Assessment" for this site, quantitative expressions of risk should be presented in a way to indicate that they are upper-bound estimates developed using many, mostly conservative, assumptions about both the potential toxicity and exposures to man. Therefore, phrases such as "risks up to" or "risks may be as much as" should precede quantitative risk numbers presented in Table 3-3 (pp 3-19). Response: See Table 3-3 of OUFS.

2. Question/Comment: Furthermore, the "uncertainties..." section on pp. 3-21 should be expanded to include additional areas of uncertainty inherent in the quantitative risk estimates, e.g.:

a. Toxicity

- (1) Choice of bioassay
- (2) Choice of data, e.g., tumor site, tumor type
- (3) Dose conversion, i.e., relationship between applied dose of the parent chemical to target organ dose of the active chemical (possibly different than the parent chemical).
- (4) Extrapolation from animal to man

- b. Exposure. Type of data; uncertainty increases as data available becomes more remote from the likely receptor (e.g., biological measurements in blood, tissues, etc. personal monitors concentrations in media plus modeling uptake emission data plus modeling fate, transport, and update...)

Response: See page 3-21 of OUFS.

3. Question/Comment: The treatment level options under active consideration include (a) no action, (b) removal to meet ARARs, and (c) treatment to background levels. In option (b), the AWQCs are considered to be among the ARARs. For nearly all the organic contaminants at the site the

AWQCs are the most conservative and drive the proposed treatment level (Table 1-1 and Table 7-1). The AWQCs may not be appropriate target treatment levels for two reasons. First, for carcinogens, the AWQCs are concentrations in drinking water which present an estimated cancer risk of less than 10 E-6 . From a public health perspective this level of protection may be unduly restrictive given the fact that subsequent treatment (chlorination) of water for drinking may produce halomethanes at concentrations in excess of those predicted to present cancer risks of 10 E-6 . Second, headquarters has recently provided additional guidance on compliance with ARAR requirements (July 9, 1987 memo from J. Winston Porter to Regional Administrators and Division Directors) which states that MCLs should be used when available and that "The Agency is still formulating a position with respect to the use of FWQC (AWQC) for protection of human health." Response: The water will be treated to attain MCL's. See Table ES-1 of OUFS.

4. Question/Comment: Will the public have a major role in selecting, from among the treatment options considered implementable, sufficiently effective, and technically feasible (those presented in Chapter 9), the specific treatment to be enforced at this site? Response: The public and appropriate agencies will have a major role in selecting the options as evidenced by the treatment of groundwater in aquifers of Subunit B/C.

RD/R9/018

CH²M HILL

Black & Veatch
ICF
PRC
Ecology and Environment

